5-4320-303-10

TM 5-4320-303-10

OPERATOR'S MANUAL

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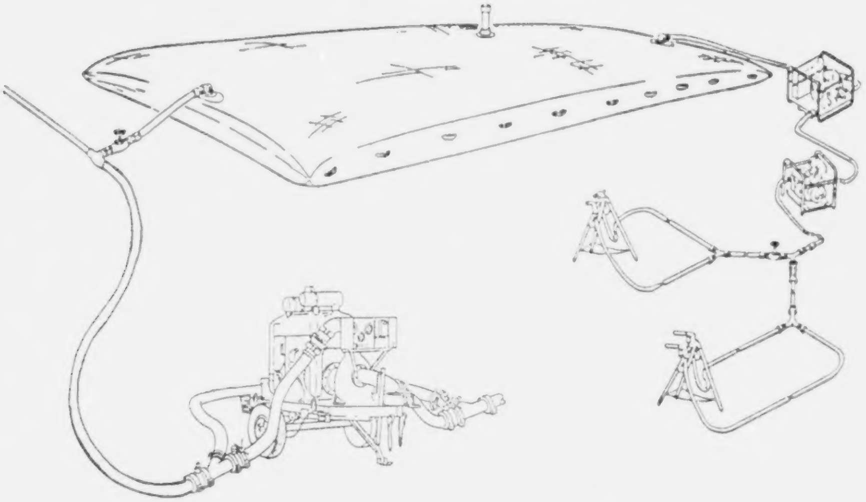


TACTICAL WATER DISTRIBUTION EQUIPMENT SYSTEM (TWDS) SET 10-MILE SEGMENT

MODEL 06749-0183-81 (4320-01-122-3547)

MODEL 110-00-0000 (4320-01-168-0591)

MODEL 919 (4320-01-168-0590)

HEADQUARTERS, DEPARTMENT OF THE ARMY
14 APRIL 1986

D 101.11:

WARNING

DANGEROUS CHEMICALS

- Calcium hypochlorite can cause serious injury if not handled properly. Heed all safety measures below.
- If calcium hypochlorite comes into contact with skin or eyes, flush right away with water. Get medical help.
- Store calcium hypochlorite in a cool, dry place. Keep container closed.
- Mix only in accordance with directions for use.
- DO NOT allow calcium hypochlorite to mix with any other materials, such as fuels, oils, paint products, or ammonia. This may cause fire or hazardous gases.

WARNING

FLAMMABLE MATERIAL

- DO NOT operate engine around open fuel. Fuel presents an extreme explosion and fire hazard. Make sure fuel lines are securely connected and free of leaks. Never refuel hot or running engine. Avoid overfilling fuel tank. Always use correct type of fuel.
- To prevent fire or explosion, keep open flame, sparks, and cigarettes away from fuel tank and battery.

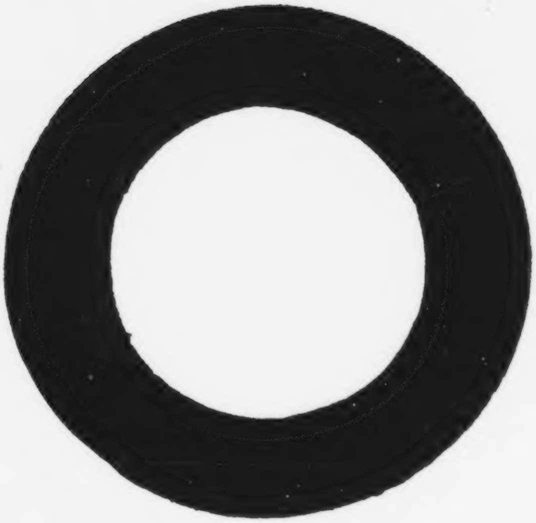
WARNING

HEARING DAMAGE

Hearing protection must be worn by personnel standing within 50 ft of operating pump.

FOR FIRST AID, SEE FM 21-11.

READEX FICHE best copy available



TECHNICAL MANUAL

NO. 5-4320-303-10

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 14 April 1986

Operator's Manual

TACTICAL WATER DISTRIBUTION EQUIPMENT SYSTEM (TWDS) SET 10-MILE SEGMENT

MODEL 06749-0183-81 (4320-01-122-3547)
MODEL 110-00-0000 (4320-01-168-0591)
MODEL 919 (4320-01-168-0590)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual direct to: Commander, U.S. Army Troop Support Command, Attention: AMSTR-MCTS, 4300 Goodfellow Boulevard, St. Louis, MO 63120-1798. A reply will be furnished to you.

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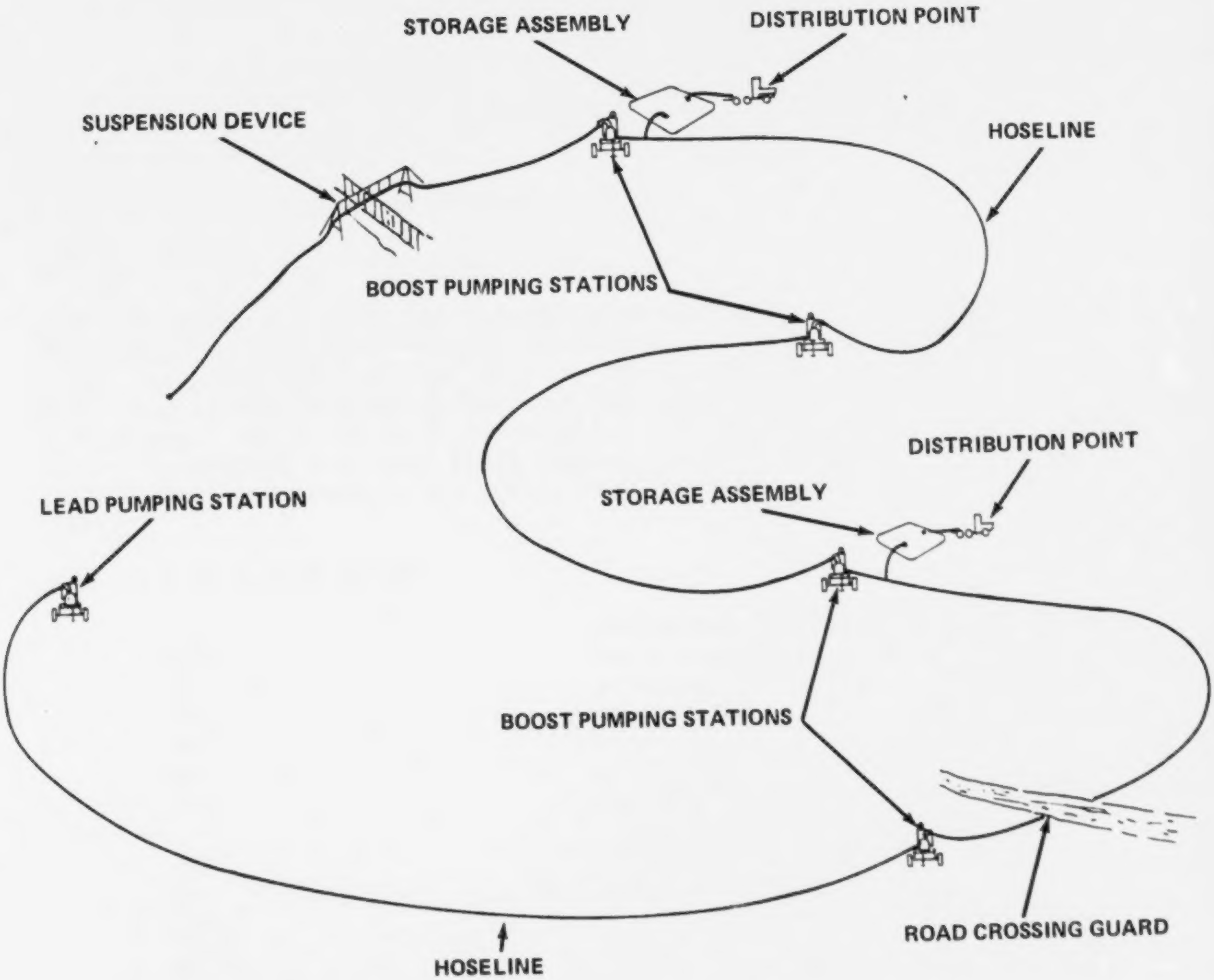

STORAGE ASSEMBLY
DISTRIBUTION POINT
SUSPENSION DEVICE
HOSELINE
BOOST PUMPING STATIONS
DISTRIBUTION POINT
LEAD PUMPING STATION
STORAGE ASSEMBLY
BOOST PUMPING STATIONS
ROAD CROSSING GUARD
HOSELINE

CHAPTER 1

INTRODUCTION

Section I. GENERAL INFORMATION

1-1. SCOPE. This manual contains instructions for operation and operator's maintenance of the Tactical Water Distribution Equipment System (TWDS) Set 10-Mile Segment. There are three models of TWDS (all performing the same function): 06749-0183-81, 110-00-0000, and 919. The TWDS receives water from large storage and distribution units supplied by wells or by desalination operations. The TWDS transports this water to small distribution points or to another large storage and distribution unit. TWDS is not intended for use with brackish or contaminated water or at temperatures below 32°F (0°C).

1-2. MAINTENANCE FORMS AND RECORDS. Department of Army forms and procedures used for equipment maintenance will be those prescribed by DA Pam 738-750, The Army Maintenance Management System (TAMMS).

1-3. REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS. If your TWDS needs improvement, let us know. Send us an Equipment Improvement Recommendations. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design or performance. Put it on an SF 368 (Quality Deficiency Report). Mail it to us at: Commander, U.S. Army Troop Support Command, Attention: AMSTR-QX, 4300 Goodfellow Boulevard, St. Louis, MO 63120-1798. We'll send you a reply.

1-4. LIST OF ABBREVIATIONS

AAL	Additional Authorization List
BII	Basic Issue Item
kg	kilogram
kPa	kilopascals
kW	kilowatt
mm	millimeter
MTOE	Modified Table of Organization and Equipment
NSN	National Stock Number
psi	pounds-per-square-inch
psig	pounds-per-square-inch-gage
RPSTL	Repair Parts and Special Tools List
SMR	Source, Maintenance, and Recoverability
spm	stroke-per-minute
TAMMS	The Army Maintenance Management System
TMDE	Test, Measurement, and Diagnostic Equipment
TOE	Table of Organization and Equipment
TWDS	Tactical Water Distribution Equipment System
UOC	Usable on Code

1-5. GLOSSARY

Brackish	Containing some salt; briny
Centrifugal	Rapid rotation around a center point that forces the object of rotation away from the center point
Chlorinate	Combining chlorine with water to purify water for drinking
Color comparator	Device that measures chlorine or pH content in water by comparing color of water sample with colors on a disc
Desalination	Removal of salt from sea water
Dike	A mound of earth to hold back water
Evacuate	Remove water from hose lengths before packing
Flake	To uncoil long length of line or hose that has been packed in such a manner as to prevent twisting, knotting, or tangling
Hypochlorination	Purifying water by combining water with a solution made from calcium hypochlorite powder
Inertial braking system	Braking system that is activated by stopping motion of towing vehicle
pH	A scale used for expressing the acidity or alkalinity of a solution
Polyethylene	A synthetic substance formed in sheets for use as packing material
Reservoir	A container used for storing water or or other liquid
Sediment	Material that settles to bottom of a liquid
Terminate	Bring to an end

Section II. EQUIPMENT DESCRIPTION

1-6. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES

a. Characteristics. Consists of two storage assemblies, two distribution points, a 10-mile hoseline segment, and five or six pumping stations. The pumping station number depends upon the terrain and distance that the stations are spread across. Smooth terrain requires five pumping stations with the sixth as a spare. Rough terrain requires all six pumping stations.

b. Capabilities and Features

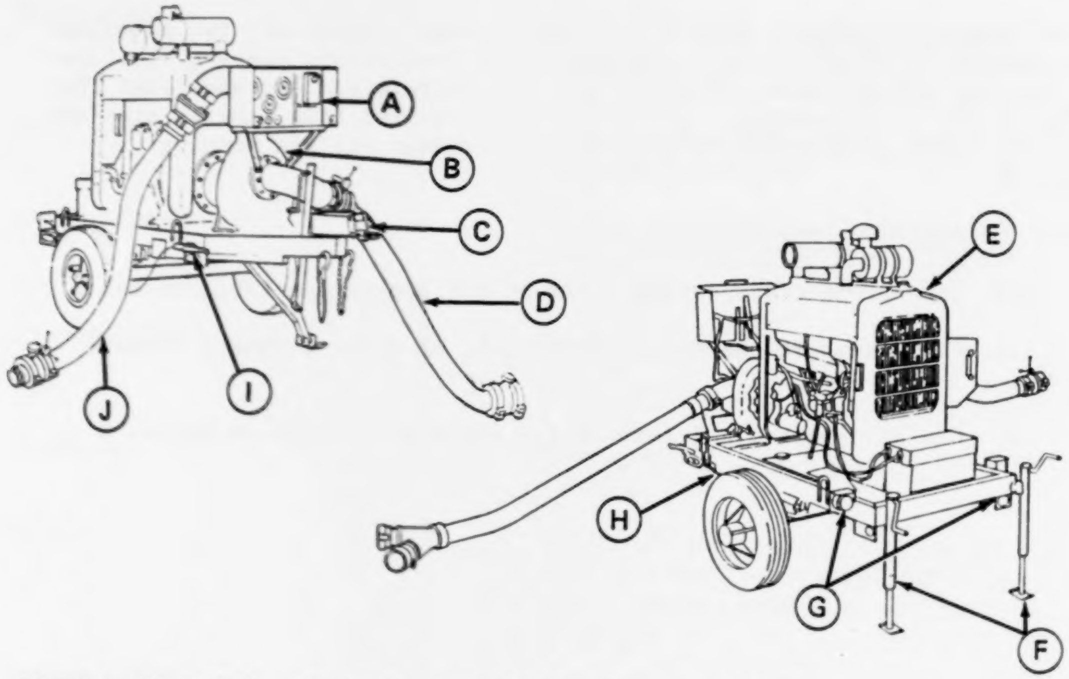
(1) Capable of transporting water at 600 gpm across level terrain.

(2) Can transport nearly 1,000,000 gal. of water within a 24-hour period.

(3) Can be unpacked and readied for operation within 48 hours.

1-7. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS

Pumping Stations: Unit 609



CONTROL PANEL (A). Controls pump and engine operations.

CENTRIFUGAL PUMP (B). Rated at 600 gpm. Draws water from source and feeds first downline boost pump. Fitted with suction and discharge elbows suitable for connection to 6 in. grooved pipe couplings.

INERTIAL BRAKING SYSTEM (C). Designed for in-transit use only. Activated by stopping motion of towing vehicle.

SUCTION HOSE ASSEMBLY (D). 6 in. x 10 ft, rigid-walled, wire-reinforced. Connects pump to water source. Equipped with quick-disconnect fittings for rapid installation.

D3400-T DIESEL ENGINE (E). Drives pump. Operating mode of engine is set on control panel mounted on pump. Operated in manual or electric manual mode.

JACKS (F). Used to level trailer-mounted pump assembly.

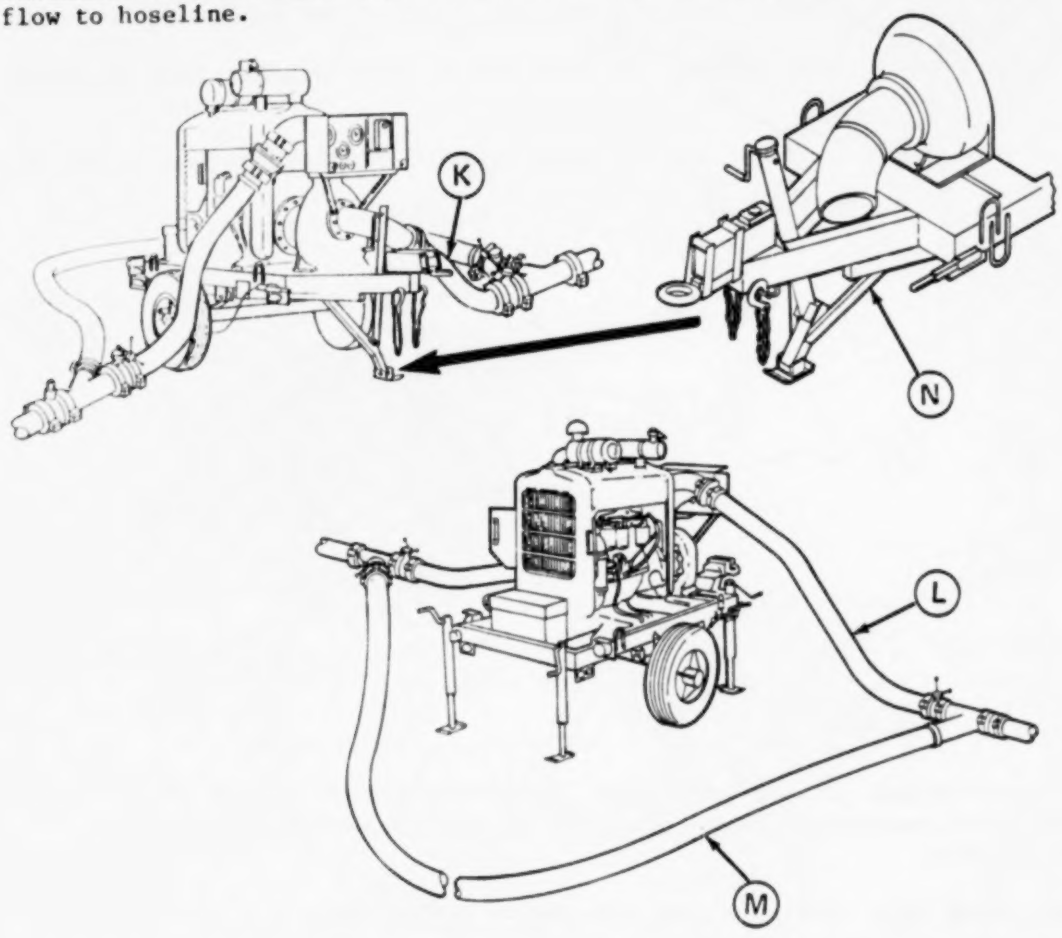
RUNNING/BRAKE LIGHTS (G). Provide visual aid during in-transit use.

TWO-WHEEL TRAILER ASSEMBLY (H). Transports pump unit.

1-7. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (CONT)

PARK BRAKES (I). Used to lock wheels in place when trailer is not in transit.

DISCHARGE HOSE ASSEMBLY (J). 6 in. x 20 ft, collapsible. Directs water flow to hoseline.



DISCHARGE HOSE ASSEMBLY (K). 6 in. x 10 ft, collapsible. Directs flow of water into suction port on pump.

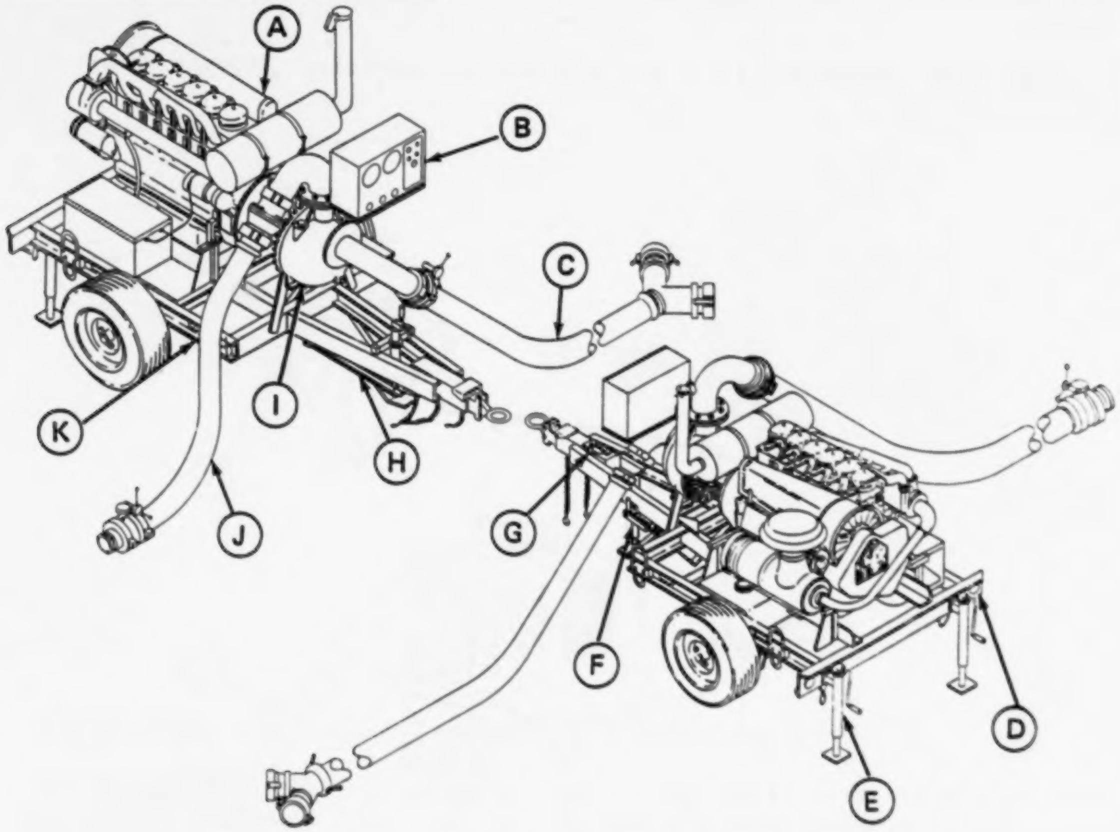
DISCHARGE HOSE ASSEMBLY (L). 6 in. x 20 ft, collapsible. Directs flow of water to hoseline or storage assembly.

DISCHARGE HOSE ASSEMBLY (M). 6 in. x 75 ft, collapsible. Part of bypass system. Allows water to bypass pump when station shuts down.

TRIPOD ASSEMBLY (N). Later models of unit 609 pump assembly are equipped with tripod that replaces double-posted jack on front of trailer chassis.

1-7. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (CONT)

Pumping Stations: US636HCCD-1



BF6L DIESEL ENGINE (A). Drives pump. Operating mode of engine is set on control panel mounted on pump. Operated in electric manual or electric automatic mode.

CONTROL PANEL (B). Controls pump and engine operations.

SUCTION HOSE ASSEMBLY (C). 6 in. x 10 ft, rigid-walled, wire-reinforced. Connects pump to water source. Equipped with quick-disconnect fittings for rapid installation.

RUNNING/BRAKE LIGHTS (D). Provide visual aid during in-transit use.

JACKS (E). Used to level trailer-mounted pump assembly.

PARK BRAKE (F). Used to lock wheels in place when not in transit.

INERTIAL BRAKING SYSTEM (G). Designed for in-transit use only. Activated by stopping motion of towing vehicle.

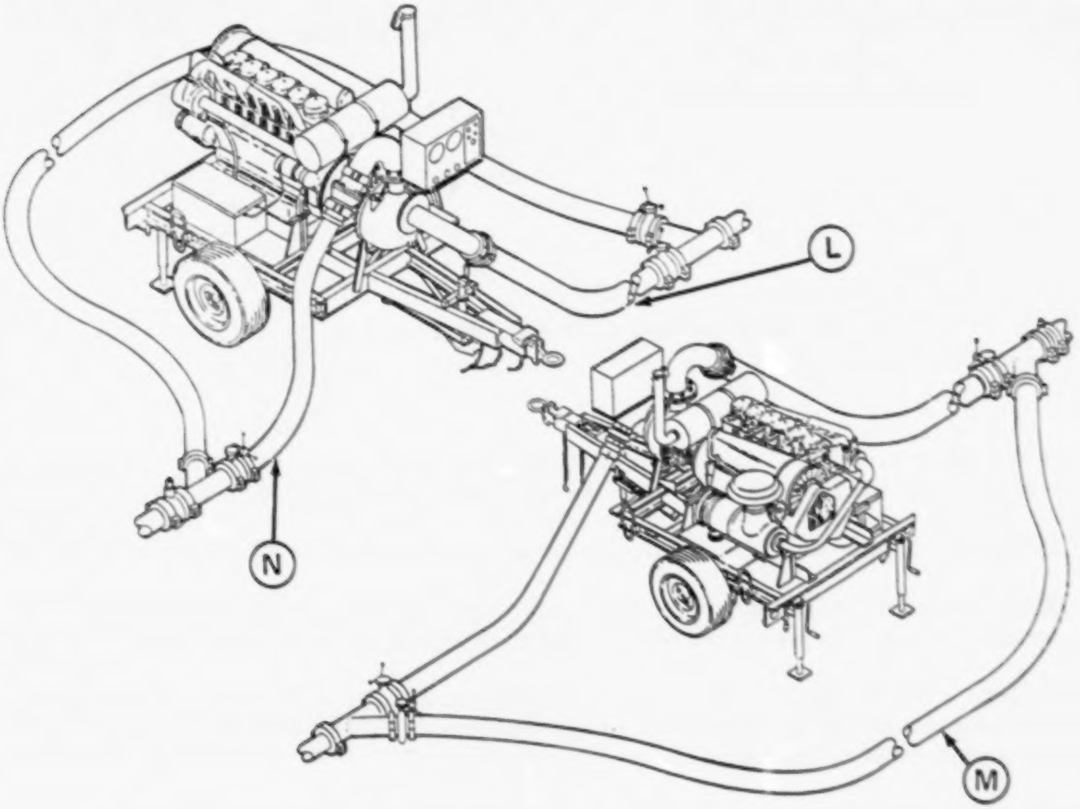
1-7. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (CONT)

FRONT TRIPOD (H). Used to level trailer-mounted pump assembly.

CENTRIFUGAL PUMP (I). Rated at 600 gpm. Draws water from source and feeds the first downline boost pump. Fitted with suction and discharge elbows suitable for connection to 6 in. grooved pipe couplings.

DISCHARGE HOSE ASSEMBLY (J). 6 in. x 20 ft, collapsible. Directs water flow to hoseline.

TWO-WHEEL TRAILER ASSEMBLY (K). Transports pump unit.



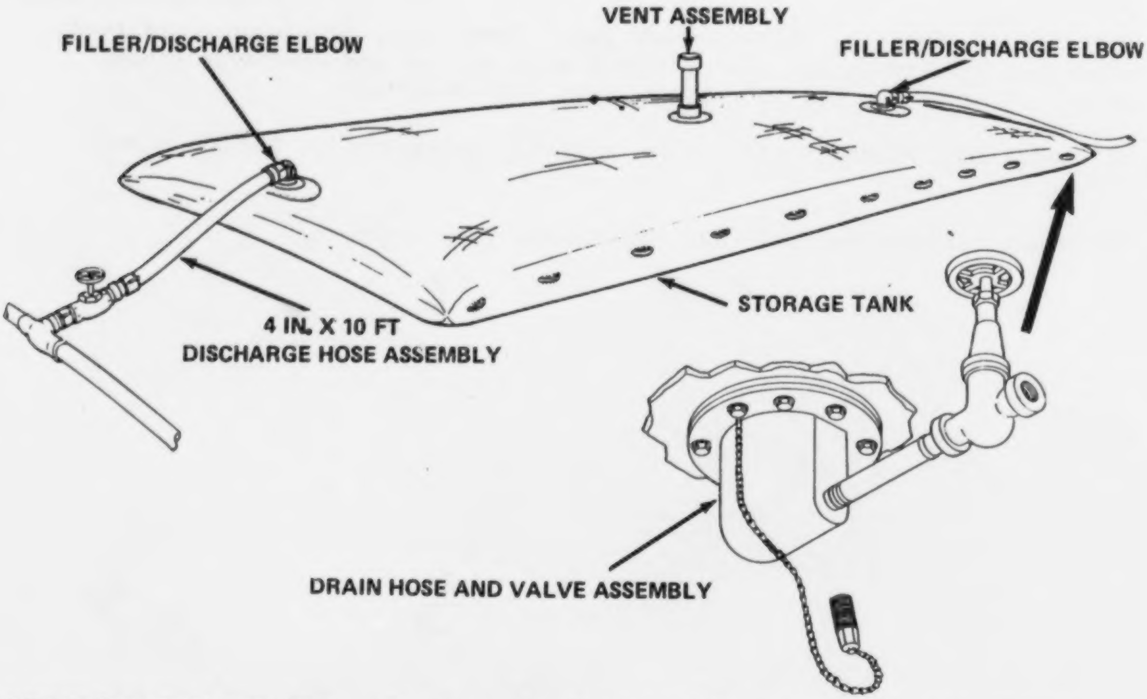
DISCHARGE HOSE ASSEMBLY (L). 6 in. x 10 ft, collapsible. Directs flow of water into suction port on pump.

DISCHARGE HOSE ASSEMBLY (M). 6 in. x 75 ft, collapsible. Part of bypass system. Allows water to bypass pump when station shuts down.

DISCHARGE HOSE ASSEMBLY (N). 6 in. x 20 ft, collapsible. Directs water flow to hoseline.

1-7. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (CONT)

Storage Assemblies


VENT ASSEMBLY
FILLER/DISCHARGE ELBOW
FILLER/DISCHARGE ELBOW
STORAGE TANK
4 IN. X 10 FT
DISCHARGE HOSE ASSEMBLY
DRAIN HOSE AND VALVE ASSEMBLY

FILLER/DISCHARGE ELBOWS. Direct water flow from hose assembly into storage tank when filling tank. Direct water flow from tank during discharge.

VENT ASSEMBLY. Opens when internal pressure reaches 0.1 psi.

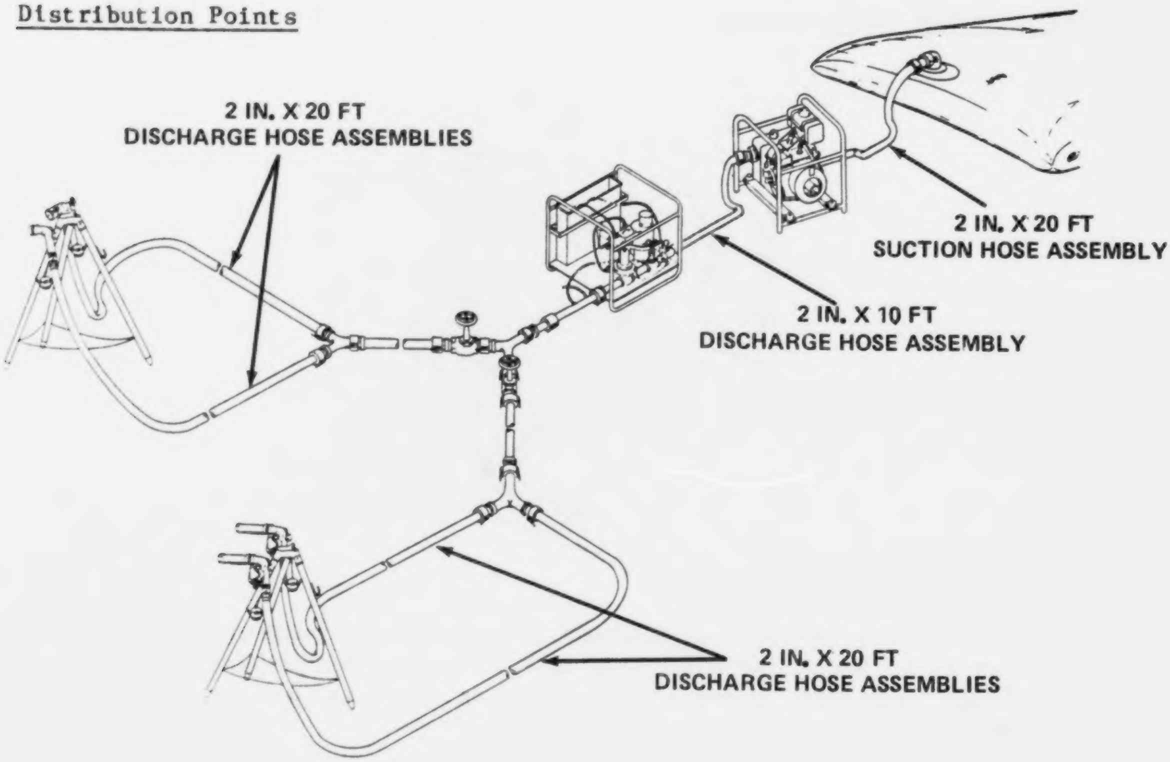
DRAIN HOSE AND VALVE ASSEMBLY. Allows water to drain from storage tank. Valve normally closed when tank is not being drained or repacked.

STORAGE TANK. 20,000 gal., collapsible, rubberized-nylon fabric. Supplies TWDS distribution point or used for water storage. Comes with kit for temporary and permanent repairs.

DISCHARGE HOSE ASSEMBLY. 4 in. x 10 ft. Feeds water from hoseline and gate valve assembly to filler fitting on storage tank.

1-7. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (CONT)

Distribution Points


2 IN. X 20 FT
DISCHARGE HOSE ASSEMBLIES
2 IN. X 20 FT
SUCTION HOSE ASSEMBLY
2 IN. X 10 FT
DISCHARGE HOSE ASSEMBLY
2 IN. X 20 FT
DISCHARGE HOSE ASSEMBLIES

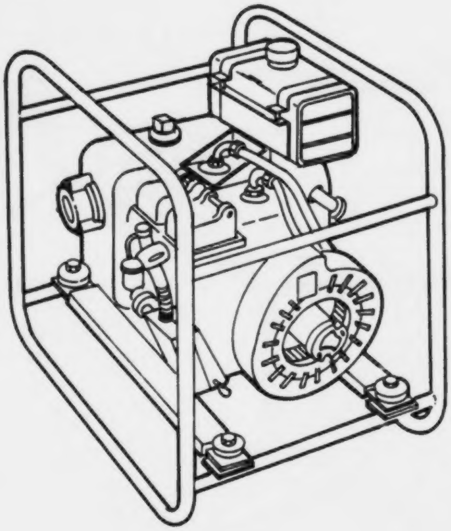
DISCHARGE HOSE ASSEMBLIES. 2 in. x 20 ft. Direct flow of water from hypochlorination unit to manual disbursing stations. Equipped with quick-disconnect fittings.

SUCTION HOSE ASSEMBLY. 2 in. x 20 ft, rigid-walled. Directs flow of water from storage tank to 125 gpm pump. Equipped with quick-disconnect fittings.

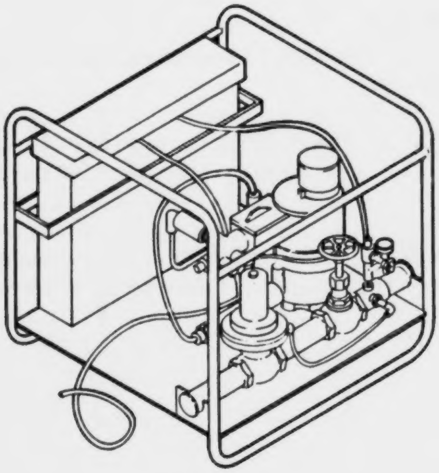
DISCHARGE HOSE ASSEMBLY. 2 in. x 10 ft. Directs flow of water from 125 gpm pump to hypochlorination unit. Equipped with quick-disconnect fitting.

1-7. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (CONT)

Distribution Points (Cont)



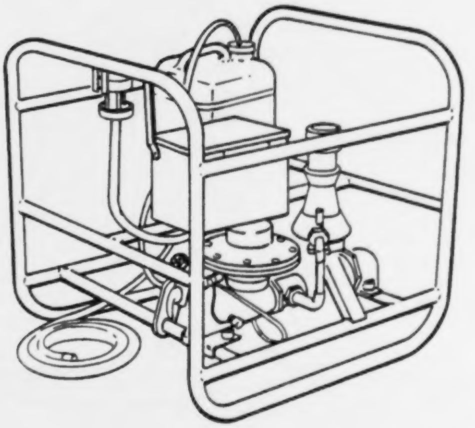
125 GPM PUMP. Skid-mounted, portable. Draws water from storage tank and delivers it to hypochlorination unit. Can be manually moved over short distances. Refer to TM 5-4320-208-12&P for operation and maintenance procedures.



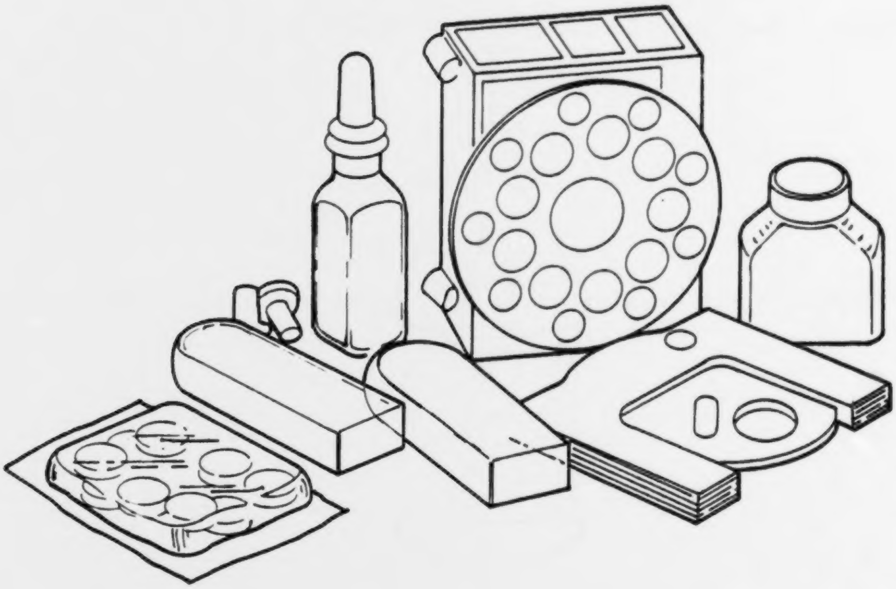
HYPOCHLORINATION UNIT: 1955-1. Skid-mounted, portable. Provides automatic chlorination of water before it is distributed.

1-7. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (CONT)

Distribution Points (Cont)



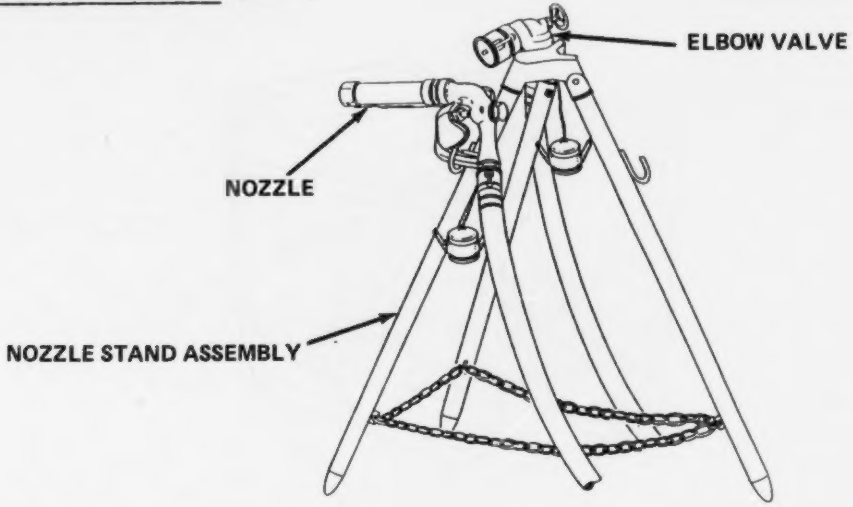
HYPOCHLORINATION UNIT: A-506131. Skid-mounted, portable. Provides automatic chlorination of water before it is distributed.



COLOR COMPARATOR KIT. Used to measure chlorine content and pH value of distributed water.

1-7. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (CONT)

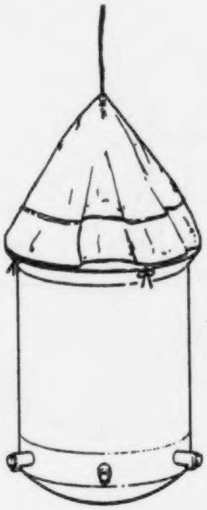
Distribution Points (Cont)



NOZZLE STAND ASSEMBLY. Collapsible tripod. Provides a place to hang manual disbursing station hoses when they are not being used.

NOZZLE. Used to fill 5 gal. cans, canteens, etc.

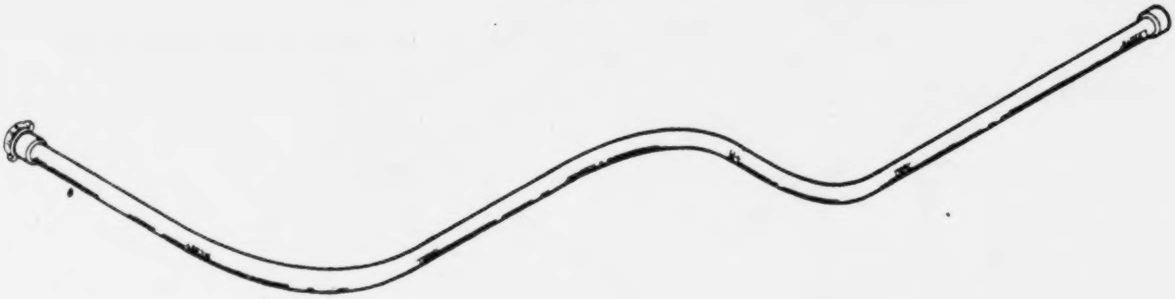
ELBOW VALVE. Used to fill tank trucks, tank trailers, etc.



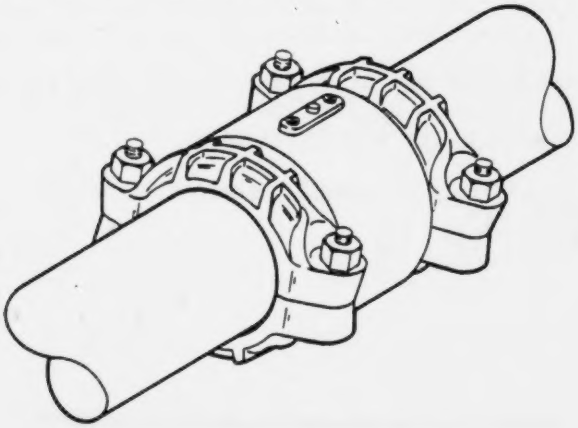
DRINKING WATER STORAGE BAG. 36 gal. capacity, cotton duck. Hangs from stand; faucets at bottom of bag distribute water to personnel.

1-7. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (CONT)

10-Mile Hoseline Segment



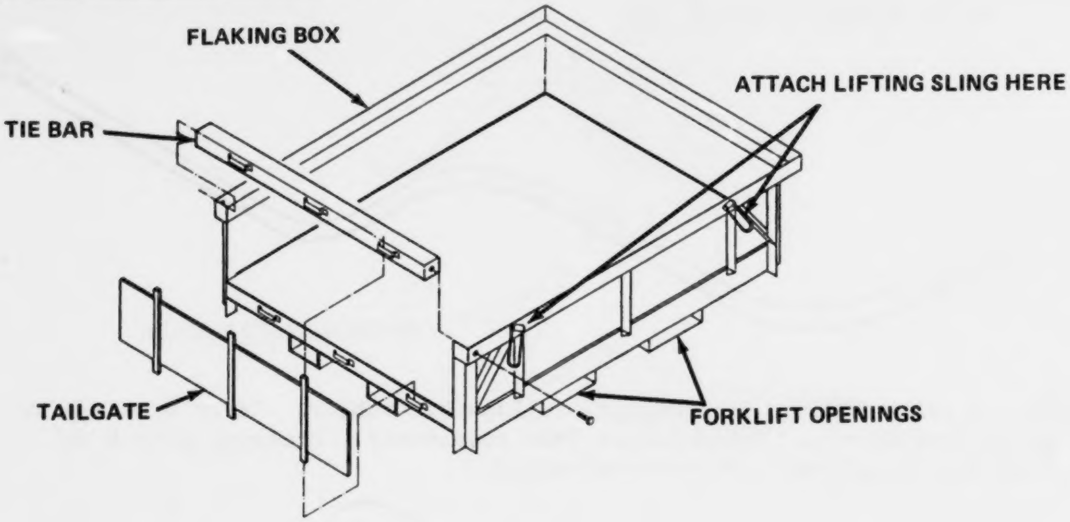
HOSES. 6 in. x 500 ft, lightweight, collapsible rubber. Carry water up to 10 miles from source. Interconnect TWDS components. Equipped with 6 in. grooved pipe couplings for interconnection.



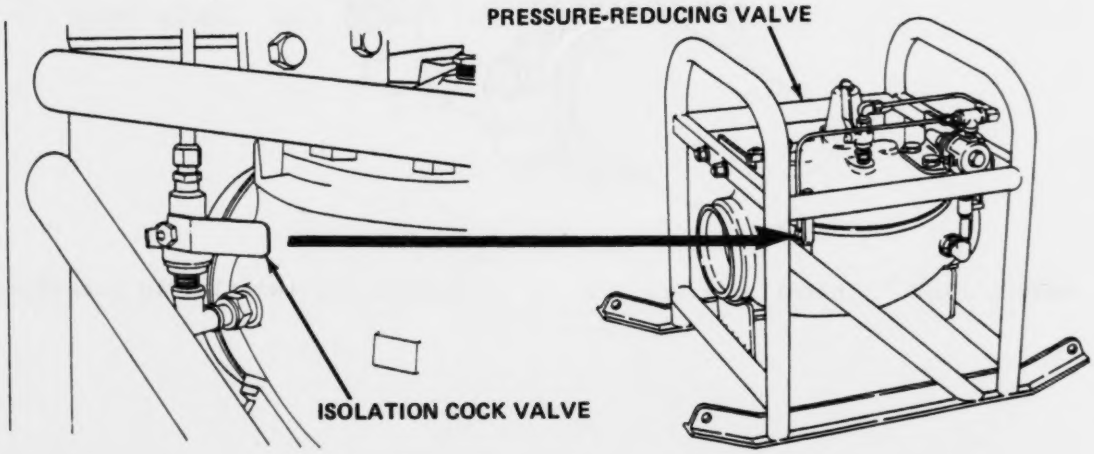
SWIVEL JOINT. Installed every 1000 ft to relieve any twisting in hoseline.

1-7. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (CONT)

10-Mile Hoseline Segment (Cont)


FLAKING BOX
ATTACH LIFTING SLING HERE
TIE BAR
TAILGATE
FORKLIFT OPENINGS

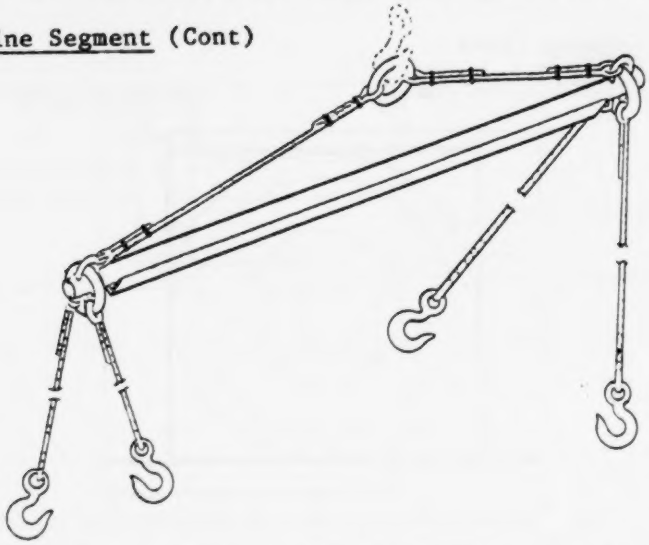
FLAKING BOXES. Each holds one 500 ft hose. Allows hose to be flaked from back of a truck. Used in groups of four boxes during hoseline-laying operations. Adapted for forklift and lifting sling.


PRESSURE-REDUCING VALVE
ISOLATION COCK VALVE

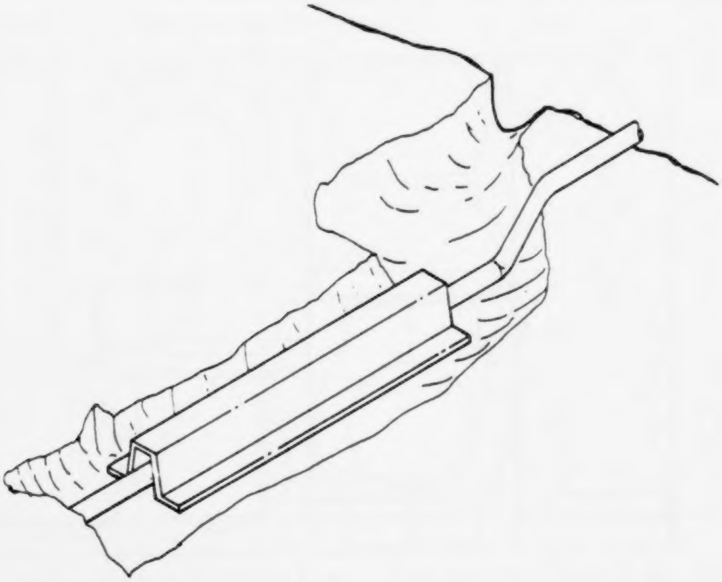
PRESSURE-REDUCING VALVE. Skid-mounted. Protects hoseline and other components from excess pressure. Installed in hoseline where water pressure is expected to exceed 225 psi. Equipped with grooved fittings at inlet and outlet ports for attachment to hoseline. Preset to release outlet pressure at a rate of 75 psig. Three isolation cock valves are manually operated to shut off pressure-reducing valve when repair is required.

1-7. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (CONT)

10-Mile Hoseline Segment (Cont)



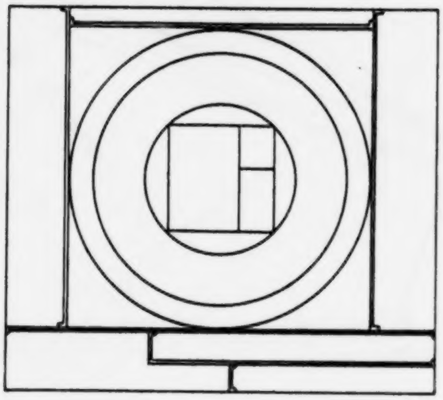
LIFTING SLING. Used for lifting flaking boxes in the field when forklift not available. Capable of lifting stack of four flaking boxes.



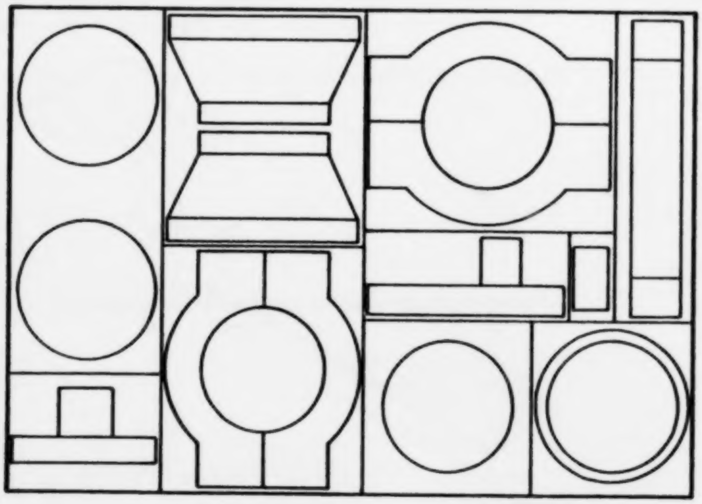
ROAD CROSSING GUARDS. Protect hoseline buried beneath a road from damage.

1-7. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (CONT)

10-Mile Hoseline Segment (Cont)



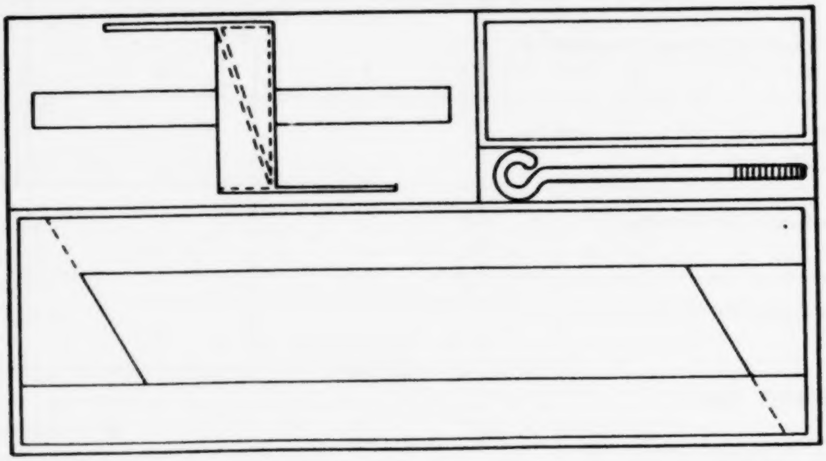
SUSPENSION KIT. Used to construct suspensions across streams, ponds, or gulleys. (Reference item 139, appendix B.)



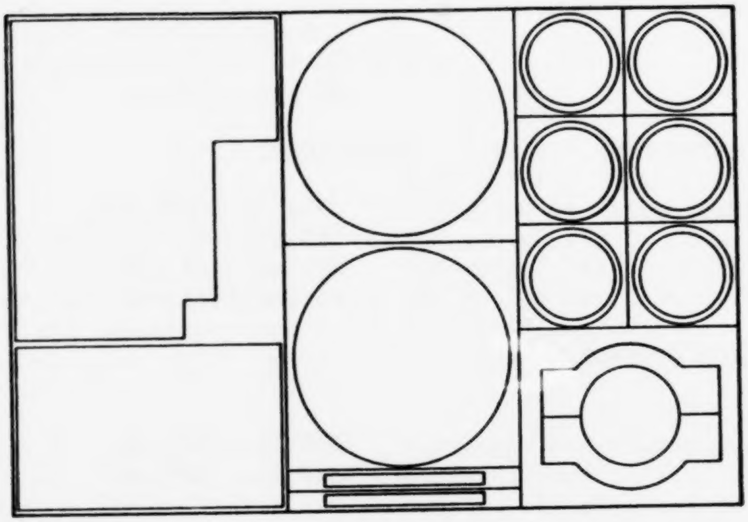
DISPLACEMENT AND EVACUATION KIT. Used to remove water and air from hoses prior to repacking. (Reference item 91, appendix B.)

1-7. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (CONT)

10-Mile Hoseline Segment (Cont)



PACKING KIT. Used to repack hoseline in flaking boxes. (Reference item 109, appendix B.)



REPAIR KIT. Used to repair hoseline. (Reference item 118, appendix B.)

1-8. DIFFERENCES BETWEEN MODELS

COMPONENTS	MODEL NUMBERS		
	06749-0183-81	110-00-0000	919
Trailer-Mounted Pump Assembly: Unit 609	X	X	
Trailer-Mounted Pump Assembly: US636HCCD-1			X
Hypochlorination Unit: 1955-1	X		X
Hypochlorination Unit: A-506131		X	

1-9. EQUIPMENT DATA

WEIGHTS AND DIMENSIONS

TRAILER-MOUNTED PUMP ASSEMBLY: UNIT 609

Weight (dry)	3052 lb (1384 kg)
Length	139 in. (353 cm)
Width	70 in. (178 cm)
Height	90 in. (229 cm)

TRAILER-MOUNTED PUMP ASSEMBLY: US636HCCD-1

Weight (dry)	2400 lb (1616 kg)
Length	135 in. (343 cm)
Width	70 in. (178 cm)
Height	69 in. (174 cm)

20,000-GALLON STORAGE TANK

Length	
Dry	336 in. (853 cm)
Full	318 in. (808 cm)
Width	
Dry	288 in. (732 cm)
Full	170 in. (432 cm)
Height (full)	66 in. (168 cm)

DISTRIBUTION POINTS

125 GPM Pump

Weight	146 lb (66 kg)
Length	22 in. (56 cm)

1-9. **EQUIPMENT DATA** (CONT)

WEIGHTS AND DIMENSIONS (CONT)

DISTRIBUTION POINTS (CONT)

Width	18 in. (45 cm)
Height	28 in. (71 cm)

Hypochlorination Unit: 1955-1

Weight	166 lb (75 kg)
Length	26 in. (66 cm)
Width	24 in. (61 cm)
Height	26 in. (66 cm)

Hypochlorination Unit: A-506131

Weight	230 lb (104 kg)
Length	33 in. (84 cm)
Width	30 in. (76 cm)
Height	31 in. (79 cm)

PERFORMANCE

TRAILER-MOUNTED PUMP ASSEMBLY: UNIT 609

Pump

Type	Self-priming, centrifugal, direct-coupled to diesel engine
Output volume	600 gpm at 350 ft tdh
Designed working pressure	150 ±5 psi (1034 ±34 kPa)
Designed suction pressure	-30 to 200 psi (138 to 1034 kPa)
Suction and discharge size	6 in. (15 cm)

Engine

Type	4-stroke, 6-cylinder diesel
Bore	4 in. (10 cm)
Stroke	4.5 in. (11 cm)
Piston displacement (entire inch)	339 cu in. (5555 cu cm)
Compression ratio	16:1
Weight	1050 lb (476 kg)
Power output	120 hp at 2400 rpm
Speed (maximum)	2500 rpm
Idle speed (minimum)	1000 rpm
Fuel	Diesel

1-9. EQUIPMENT DATA (CONT)

PERFORMANCE (CONT)

TRAILER-MOUNTED PUMP ASSEMBLY: UNIT 609 (CONT)

Engine (Cont)

Lubrication	Forced lubrication
Valve clearance (cold)	0.015 in. (0.381 mm)
Crankcase capacity	6 qt (5.7 L)
Fuel tank capacity	12 gal. (45.42 L)
Radiator capacity	7 gal. (26.50 L)

TRAILER-MOUNTED PUMP ASSEMBLY: US636HCCD-1

Pump

Type	Self-priming, centrifugal, direct-coupled to diesel engine
Output volume	600 gpm at 350 ft tdh
Designed working pressure	150 ±5 psi (1034 ±34 kPa)
Designed suction pressure	-30 to 200 psi (138 to 1034 kPa)
Suction and discharge size	6 in. (15 cm)

Engine

Type	4-stroke, 6-cylinder diesel
Bore	102 mm (4.015 in.)
Stroke	125 mm (4.922 in.)
Piston displacement (entire inch)	6128 cu cm (374 cu in.)
Compression ratio	15.5:1
Weight	515 kg (1133 lb)
Power output (maximum)	160 hp (118 kW) at 2500-2800 rpm
Speed (maximum)	2500 rpm
Idle speed (minimum)	650 rpm
Fuel	Diesel or JP-4
Lubrication	Forced lubrication
Valve clearance (cold)	0.15 mm (0.006 in.)
Crankcase capacity	15.136 L (16 qt)
Fuel tank capacity	45.42 L (12 gal)

1-9. **EQUIPMENT DATA** (CONT)

PERFORMANCE (CONT)

DISTRIBUTION POINTS

125 GPM Pump

Pump	
Type	Centrifugal, direct-coupled to gasoline engine
Rating	125 gpm at 50 ft tdh
Engine	
Type	4-stroke, 2-cylinder gasoline
Power rating	3 hp at 3600 rpm
Capacities	
Fuel tank	1 gal. (3.8 L)
Crankcase	4/5 qt (0.75 L)

Hypochlorination Unit: 1955-1

Flow	100 gpm maximum 2 gpm minimum
Ambient temperature range	35° to 130°F (1.7° to 54.4°C)
Range	10:1
Hypo feed rate	55 gpd
Reservoir container	5 gal. (19 L)
Inlet and outlet pipe size	2 in. fpt

Hypochlorination Unit: A-506131

Flow	100 gpm maximum 2 gpm minimum
Ambient Temperature Range	35° to 130°F (1.7° to 54.4°C)
Range	10:1
Hypo feed rate	60 gpd
Reservoir container	5 gal. (19 L)
Inlet and outlet pipe size	2 in. fpt

Section III. TECHNICAL PRINCIPLES OF OPERATION

1-10. GENERAL. TWDS transports potable water across level terrain for distances up to 10 miles. It may be stored in two 20,000 gal. storage tanks, chlorinated and distributed for drinking by personnel, or used to supply a large storage and distribution unit. The following is an explanation of how each functional group contributes to operation of the entire system.

1-11. FUNCTIONAL GROUPS

a. Pumping Stations. Each pumping station consists of a trailer-mounted pump assembly, a check valve, butterfly valves, and several 6 in. diameter hose assemblies. Pump assembly is powered by a six-cylinder diesel engine. Pump operation is controlled through panel, mounted on pump.

(1) Lead Pumping Station. Draws water from large storage and distribution unit that is supplied by wells or desalination operations. Feeds water downline through hoseline to first boost pumping station. Operated in manual or electric manual modes. Flow of water through unit is controlled by manually operating butterfly valves on suction and discharge hoses. Psi is regulated by adjusting engine speed.

(2) Boost Pumping Stations. Draw water from hoseline and feed it downline to next boost pumping station or storage assembly. After initial startup, boost pumps can be switched to electric automatic mode. Engine speed will be regulated automatically. If pumping station fails, water can be routed through bypass hose assembly to keep downline pumps primed. Flow of water is controlled by manually operating inline butterfly valves. Psi is regulated by adjusting engine speed.

b. Storage Assemblies. Each assembly can collect up to 20,000 gal. of water tapped from hoseline. Tank fill rate is controlled by manually operating gate valve. Tanks are used for storage or to supply water to distribution point.

c. Distribution Points. Each distribution point is made up of a 125 gpm pump, hypochlorination unit, and network of hoses. Pump draws water from storage assembly and feeds it through hypochlorination unit to be purified for drinking. Water is then routed through network of hoses to manual disbursing stations for distribution to personnel.

(1) 125 GPM Pump. Skid-mounted, manually controlled, and directly driven by small gasoline engine.

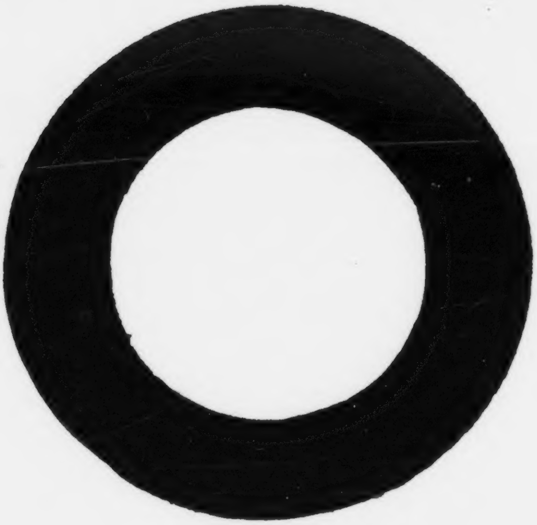
(2) Hypochlorination Unit. Skid-mounted unit, powered by impulse diaphragm motor which operates on water pressure. Amount of chlorine injected into water is controlled by adjusting pump stroke. Rate of water flow through unit is controlled by adjusting inline valves. Once controls are set, unit usually requires no further adjustments. It will inject same dosage of chlorine into the water, regardless of changes in flow rate. Operator periodically refills the 5 gal. chlorine solution reservoir. Water at manual disbursing stations is tested periodically by using color comparator kit.

(3) Hose Network and Manual Dispersing Stations. Rate of water flow through network is controlled by adjusting inline gate valves. Network ends at four manual dispersing stations, where elbow valves or nozzles are attached to hose ends. A 36 gal. drinking water storage bag, suspended on

1-11. **FUNCTIONAL GROUPS** (CONT)

a tripod and fitted with faucets, is used to dispense water to personnel for canteens and other small containers. Water bag requires periodic refilling by operator.

d. 10-Mile Hoseline Segment. Transfers water to each major component in system. Consists of 500 ft segments of collapsible hoseline that connect pumping stations, storage assemblies, and distribution points. A skid-mounted pressure-reducing valve is installed in hoseline to protect it from excess pressure. Suspension devices are used to route hose over obstacles in terrain, and road crossing guards protect hoseline when it crosses roads. Hoseline can be capped if dead-end service is required, or it can feed another large storage and distribution unit.



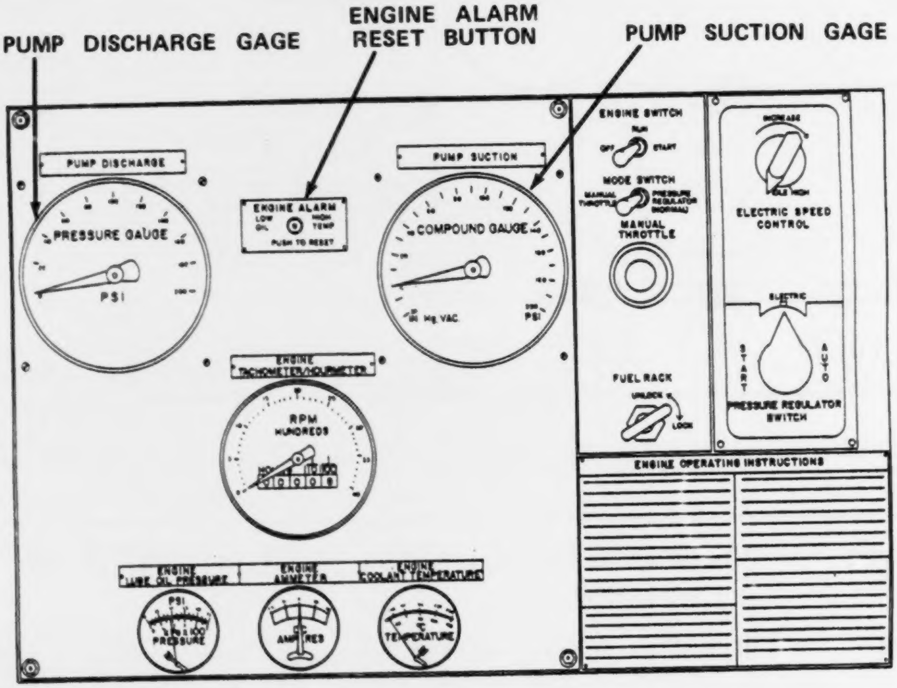
CHAPTER 2

OPERATING INSTRUCTIONS

Section I. DESCRIPTION AND USE OF OPERATOR'S CONTROLS AND INDICATORS

2-1. OPERATOR'S CONTROLS AND INDICATORS

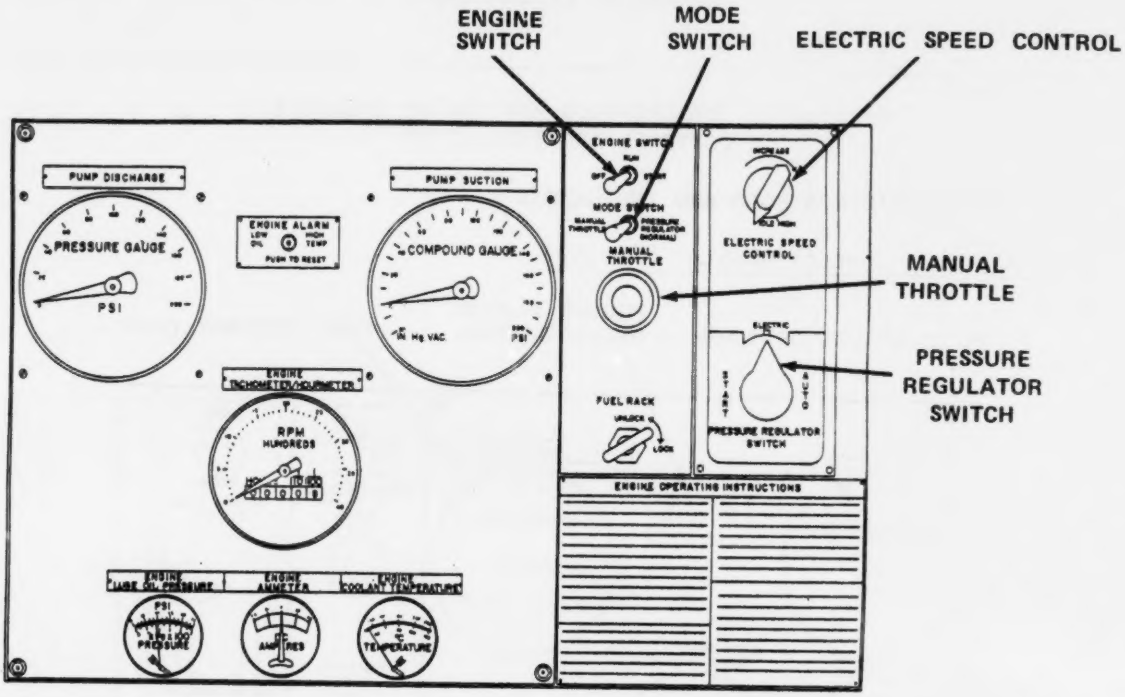
Pump Assembly Control Panel: Unit 609


PUMP DISCHARGE GAGE
ENGINE ALARM RESET BUTTON
PUMP SUCTION GAGE
PUMP DISCHARGE
PRESSURE GAUGE
PSI
ENGINE ALARM
LOW OIL
HIGH TEMP
PUSH TO RESET
PUMP SUCTION
COMPOUND GAUGE
Hg VAC
PSI
ENGINE SWITCH
RUN
OFF
START
MODE SWITCH
MANUAL THROTTLE
PRESSURE REGULATOR (NORMAL)
MANUAL THROTTLE
INCREASE
IDLE HIGH
ELECTRIC SPEED CONTROL
ELECTRIC
START
AUTO
PRESSURE REGULATOR SWITCH
FUEL RACK
UNLOCK
LOCK
ENGINE TACHOMETER/HOURMETER
RPM HUNDREDS
ENGINE OPERATING INSTRUCTIONS
ENGINE LUBE OIL PRESSURE
ENGINE AMMETER
ENGINE COOLANT TEMPERATURE
PSI
PRESSURE
AMPERES
TEMPERATURE

Control or Indicator	Function
PUMP DISCHARGE Gage	Shows pump discharge pressure. Range is 0 to 200 psi.
ENGINE ALARM Reset Button	PUSH TO RESET alarm. Alarm sounds when oil pressure is too low, engine temperature is too high, or engine does not start within 30 seconds.
PUMP SUCTION Gage	Shows pump suction pressure. Range is -30 to 200 psi.

2-1. OPERATOR'S CONTROLS AND INDICATORS (CONT)

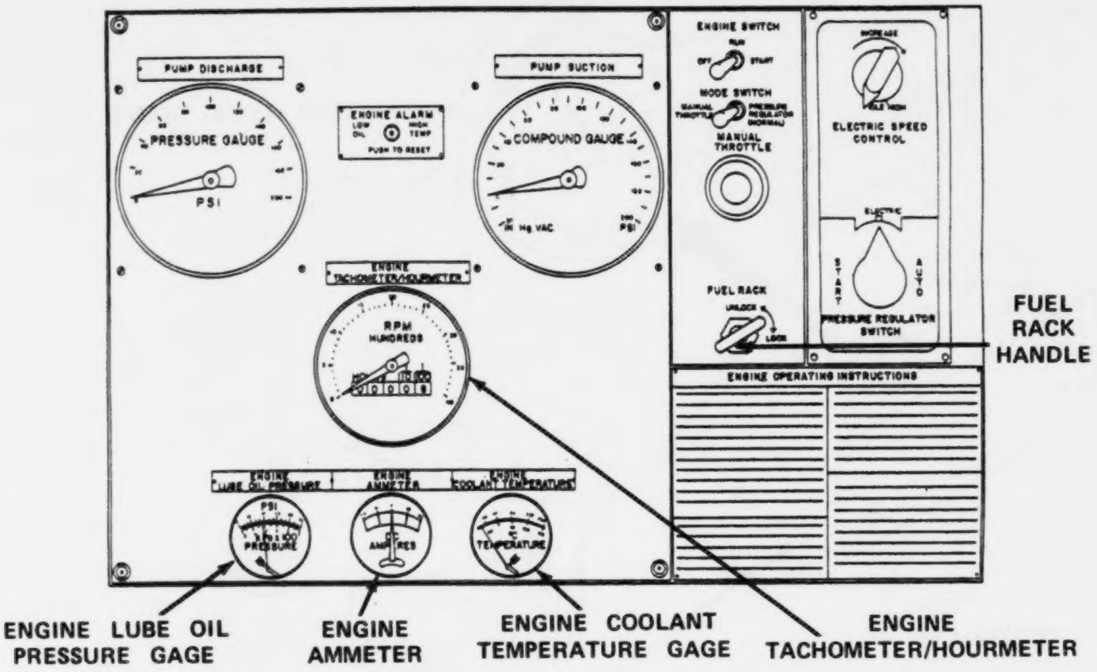
Pump Assembly Control Panel: Unit 609 (Cont)


ENGINE SWITCH
MODE SWITCH
ELECTRIC SPEED CONTROL
MANUAL THROTTLE
PRESSURE REGULATOR SWITCH
PUMP DISCHARGE
PRESSURE GAUGE
PSI
ENGINE ALARM
LOW OIL
HIGH TEMP
PUSH TO RESET
PUMP SUCTION
COMPOUND GAUGE
IN HG VAC
PSI
ENGINE TACHOMETER/HOURMETER
RPM HUNDREDS
ENGINE LUBE OIL PRESSURE
ENGINE AMMETER
ENGINE COOLANT TEMPERATURE
PSI
PRESSURE
AMPERES
TEMPERATURE
ENGINE SWITCH
OFF
RUN
START
MODE SWITCH
MANUAL THROTTLE
PRESSURE REGULATOR (NORMAL)
MANUAL THROTTLE
FUEL RACK
UNLOCK
LOCK
INCREASE
IDLE
HIGH
ELECTRIC SPEED CONTROL
ELECTRIC
START
AUTO
PRESSURE REGULATOR SWITCH
ENGINE OPERATING INSTRUCTIONS

Control or Indicator	Function
ENGINE SWITCH	Used to start engine. Set to START, RUN, or OFF positions.
MODE SWITCH	Used to control engine operating mode. Set to MANUAL THROTTLE for manual mode. Set to PRESSURE REGULATOR (NORMAL) for other modes.
ELECTRIC SPEED CONTROL	Used to control engine speed in electric manual mode. Range is IDLE to HIGH.
MANUAL THROTTLE	Used to control engine speed in manual mode.
PRESSURE REGULATOR SWITCH	Used to control electric speed governor. Regulates suction/discharge pressure and engine speed in electric automatic mode. Set at START, ELECTRIC (electric manual mode), or AUTOMATIC (electric automatic mode).

2-1. OPERATOR'S CONTROLS AND INDICATORS (CONT)

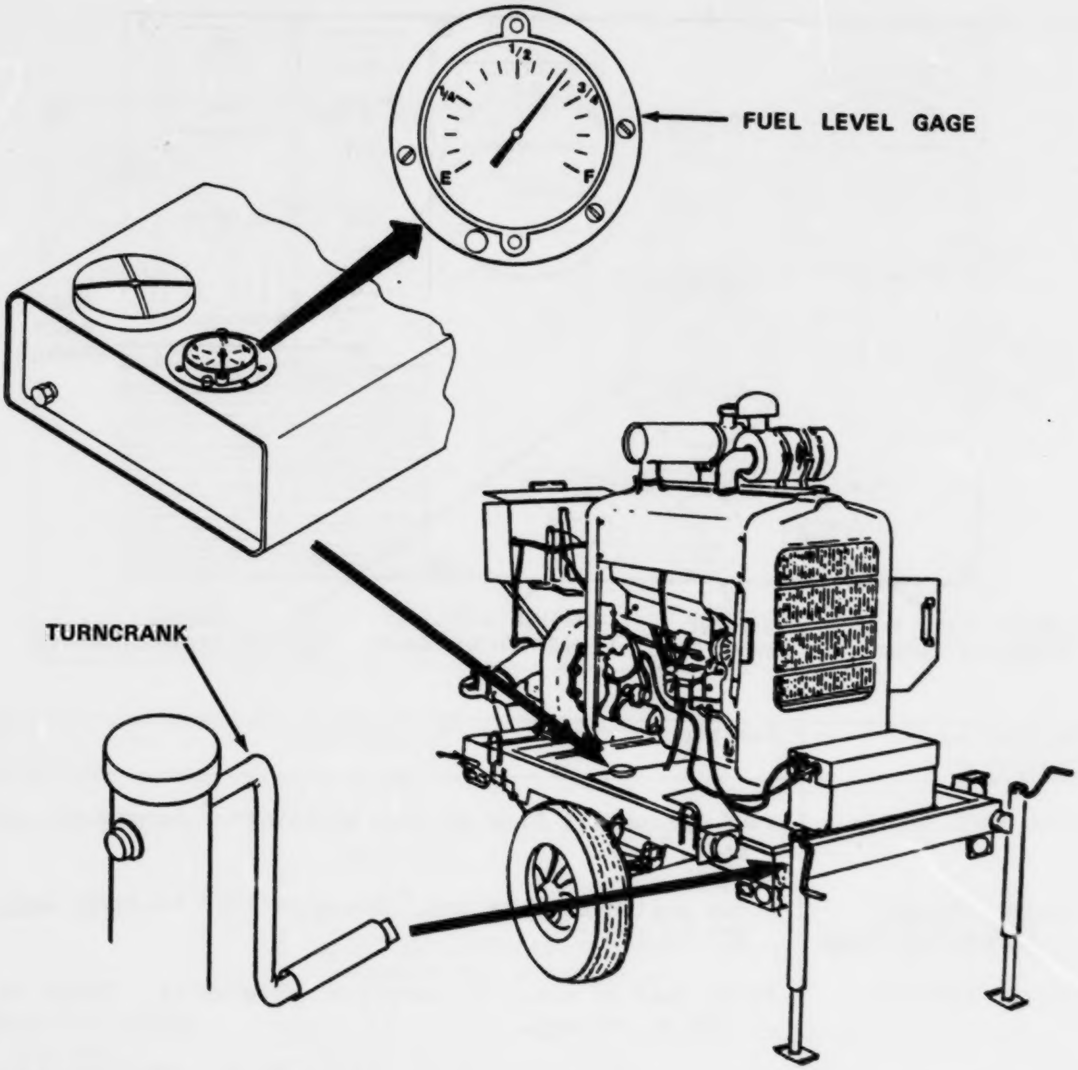
Pump Assembly Control Panel: Unit 609 (Cont)


PUMP DISCHARGE
PRESSURE GAUGE
PSI
ENGINE ALARM
LOW OIL
HIGH TEMP
PUSH TO RESET
PUMP SUCTION
COMPOUND GAUGE
Hg VAC
PSI
ENGINE TACHOMETER/HOURMETER
RPM HUNDREDS
ENGINE LUBE OIL PRESSURE
ENGINE AMMETER
ENGINE COOLANT TEMPERATURE
ENGINE SWITCH
RUN
OFF
START
MODE SWITCH
MANUAL THROTTLE
PRESSURE REGULATOR (NORMAL)
MANUAL THROTTLE
FUEL RACK
UNLOCK
LOCK
INCREASE
IDLE HIGH
ELECTRIC SPEED CONTROL
ELECTRIC
START
AUTO
PRESSURE REGULATOR SWITCH
ENGINE OPERATING INSTRUCTIONS
FUEL RACK HANDLE
ENGINE LUBE OIL PRESSURE GAGE
ENGINE AMMETER
ENGINE COOLANT TEMPERATURE GAGE
ENGINE TACHOMETER/HOURMETER

Control or Indicator	Function
FUEL RACK Handle	Used to control flow of fuel to governor in manual mode.
ENGINE COOLANT TEMPERATURE Gage	Shows engine temperature. Range is 130° to 250°F and 40° to 120°C.
ENGINE AMMETER	Shows rate of electric output by alternator. Range is -60 to +60 amp.
ENGINE LUBE OIL PRESSURE Gage	Shows engine oil pressure. Range is 0 to 75 psi and 0 to 5 kPa X 100.
ENGINE TACHOMETER/ HOURMETER	Tachometer shows engine rpm. Range is 0 to 40 (X 100) rpm. Hourmeter shows amount of time engine has operated. Displays hours, tenths of an hour, and hundredths of an hour.

2-1. OPERATOR'S CONTROLS AND INDICATORS (CONT)

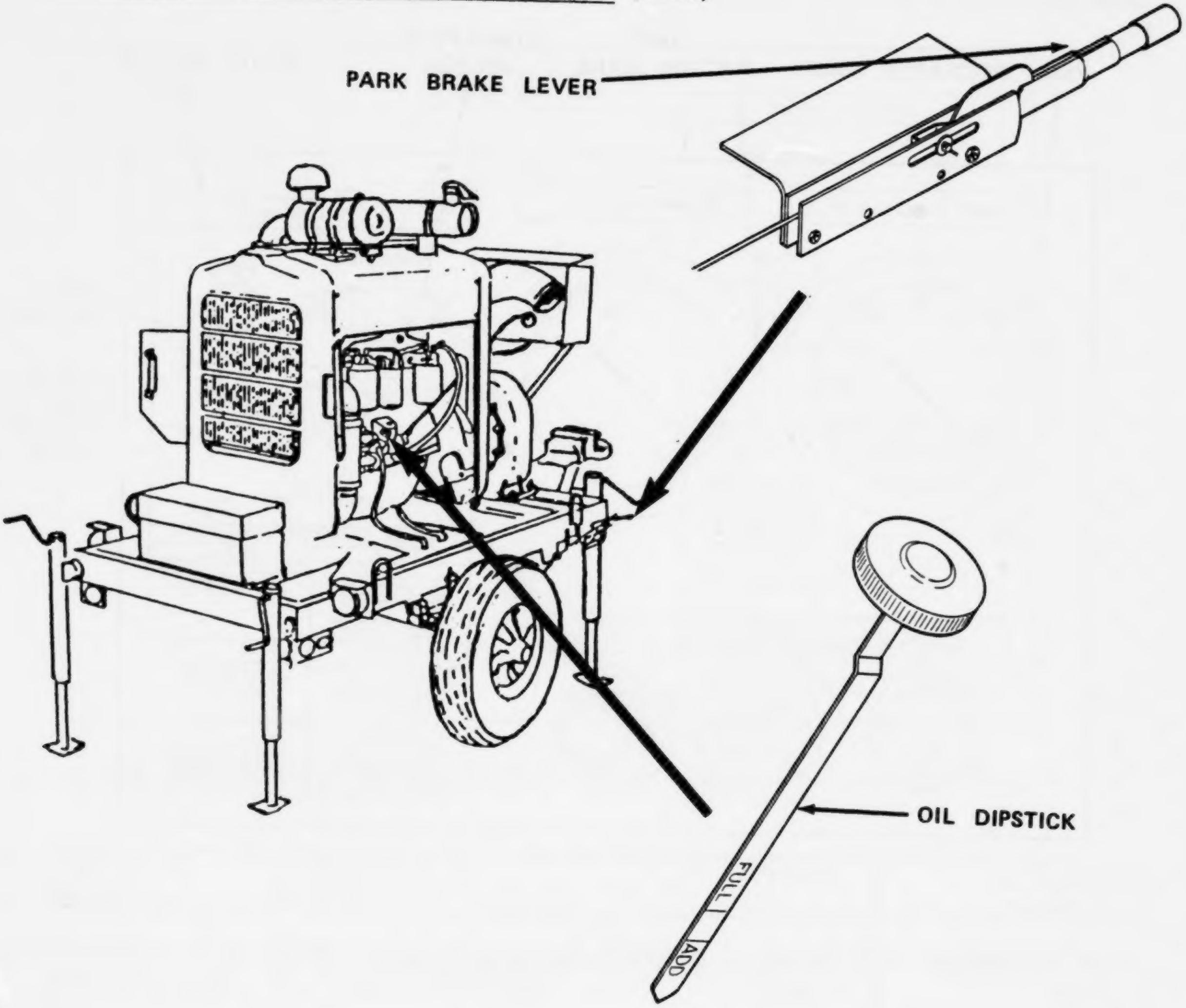
Trailer-Mounted Pump Assembly: Unit 609


1/4
1/2
3/4
E
F
FUEL LEVEL GAGE
TURNCRANK

Control or Indicator	Function
Fuel Level Gage	Indicates amount of fuel in tank. Registers from E (empty) to F (full).
Turncrank	Used to raise and lower jacks to level trailer-mounted pump assembly.

2-1. OPERATOR'S CONTROLS AND INDICATORS (CONT)

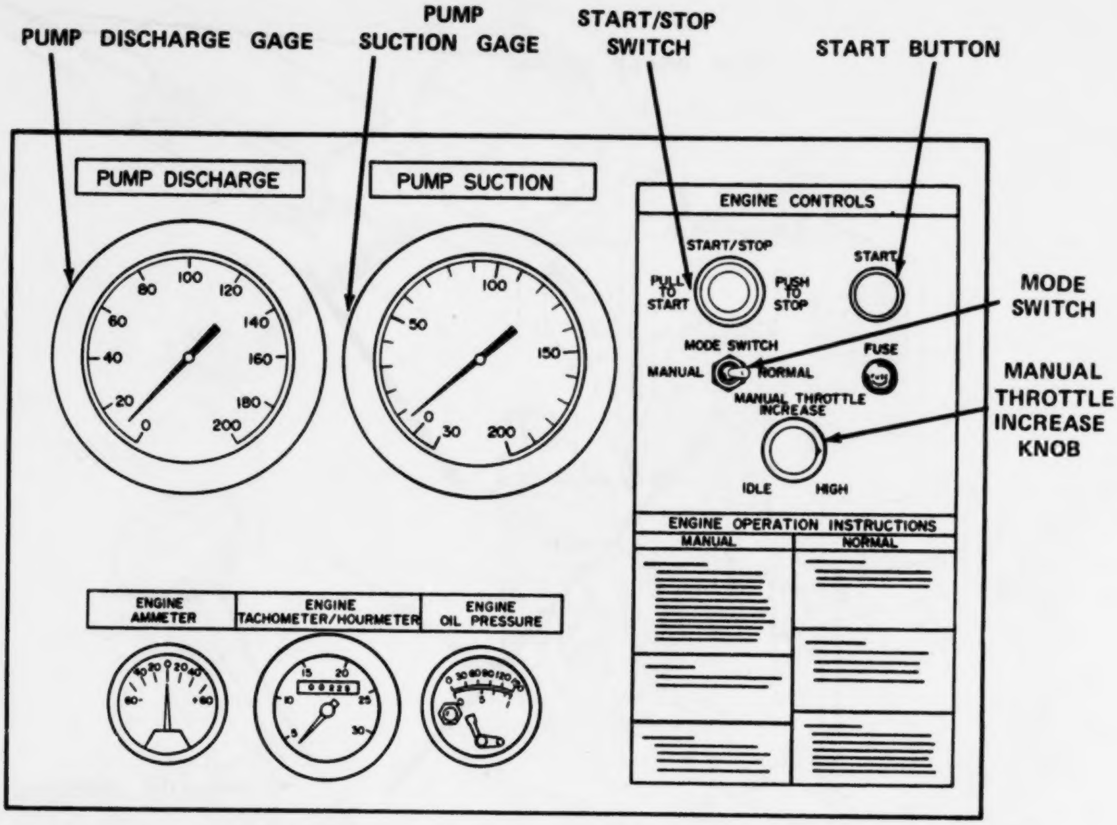
Trailer-Mounted Pump Assembly: Unit 609 (Cont)



Control or Indicator	Function
Park Brake Levers	Used to lock wheels when trailer-mounted pump assembly is parked. Located on both sides of trailer. Pull levers toward front of trailer to lock wheels. End cap on levers used to adjust brake cable tension.
Oil Dipstick	Used to determine level of oil in crankcase. Gage is marked with ADD and FULL lines.

2-1. OPERATOR'S CONTROLS AND INDICATORS (CONT)

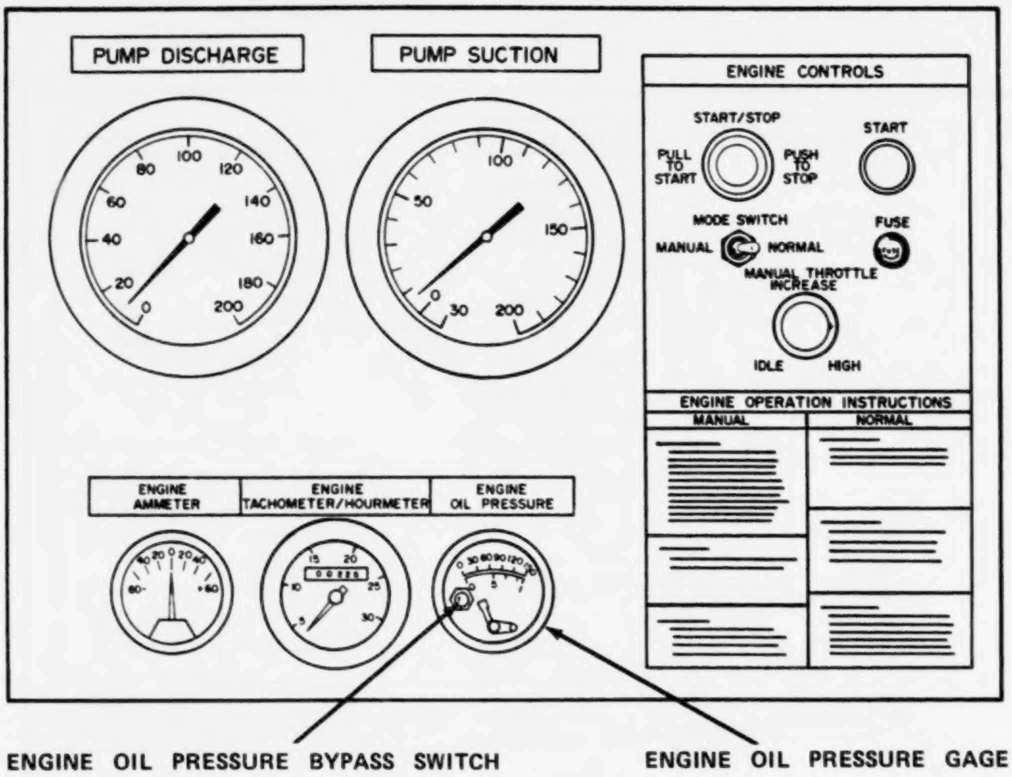
Pump Assembly Control Panel: US636HCCD-1


PUMP DISCHARGE GAGE
PUMP SUCTION GAGE
START/STOP SWITCH
START BUTTON
MODE SWITCH
MANUAL THROTTLE INCREASE KNOB
PUMP DISCHARGE
PUMP SUCTION
ENGINE CONTROLS
START/STOP
PULL TO START
PUSH TO STOP
START
MODE SWITCH
MANUAL
NORMAL
FUSE
MANUAL THROTTLE INCREASE
IDLE
HIGH
ENGINE OPERATION INSTRUCTIONS
MANUAL
NORMAL
ENGINE AMMETER
ENGINE TACHOMETER/HOURMETER
ENGINE OIL PRESSURE
0
20
40
60
80
100
120
140
160
180
200
30
50
150

Control or Indicator	Function
PUMP DISCHARGE Gage	Displays pump discharge pressure. Range is 0 to 200 psi.
PUMP SUCTION Gage	Displays pump suction pressure. Range is -30 to 200 psi.
START/STOP Knob	PULL TO START and PUSH TO STOP positions.
START Button	Used to start engine. Push in to start engine.
MANUAL THROTTLE INCREASE Knob	Used to control engine speed in electric manual mode. Range is IDLE to HIGH.
MODE SWITCH	Used to control engine operating mode. Set to MANUAL for electric manual mode. Set to NORMAL for electric automatic mode.

2-1. OPERATOR'S CONTROLS AND INDICATORS (CONT)

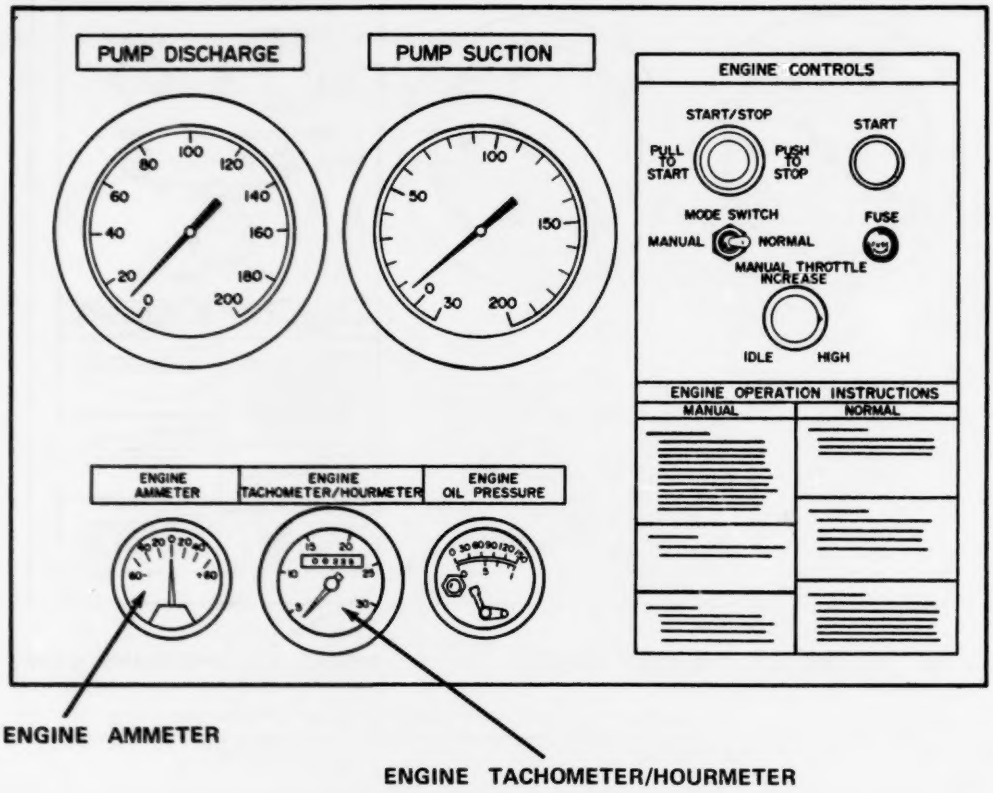
Pump Assembly Control Panel: US636HCCD-1 (Cont)


PUMP DISCHARGE
PUMP SUCTION
ENGINE CONTROLS
START/STOP
PULL TO START
PUSH TO STOP
START
MODE SWITCH
MANUAL
NORMAL
FUSE
MANUAL THROTTLE
INCREASE
IDLE
HIGH
ENGINE OPERATION INSTRUCTIONS
MANUAL
NORMAL
ENGINE AMMETER
ENGINE TACHOMETER/HOURMETER
ENGINE OIL PRESSURE
ENGINE OIL PRESSURE BYPASS SWITCH
ENGINE OIL PRESSURE GAGE

Control or Indicator	Function
ENGINE OIL PRESSURE Gage	Displays engine oil pressure. Range is 0 to 150 psi and 0 to 1 MPa.
Engine Oil Pressure Bypass Switch	Overrides oil pressure shutoff switch when starting engine. Push in at same time when pushing START button.

2-1. OPERATOR'S CONTROLS AND INDICATORS (CONT)

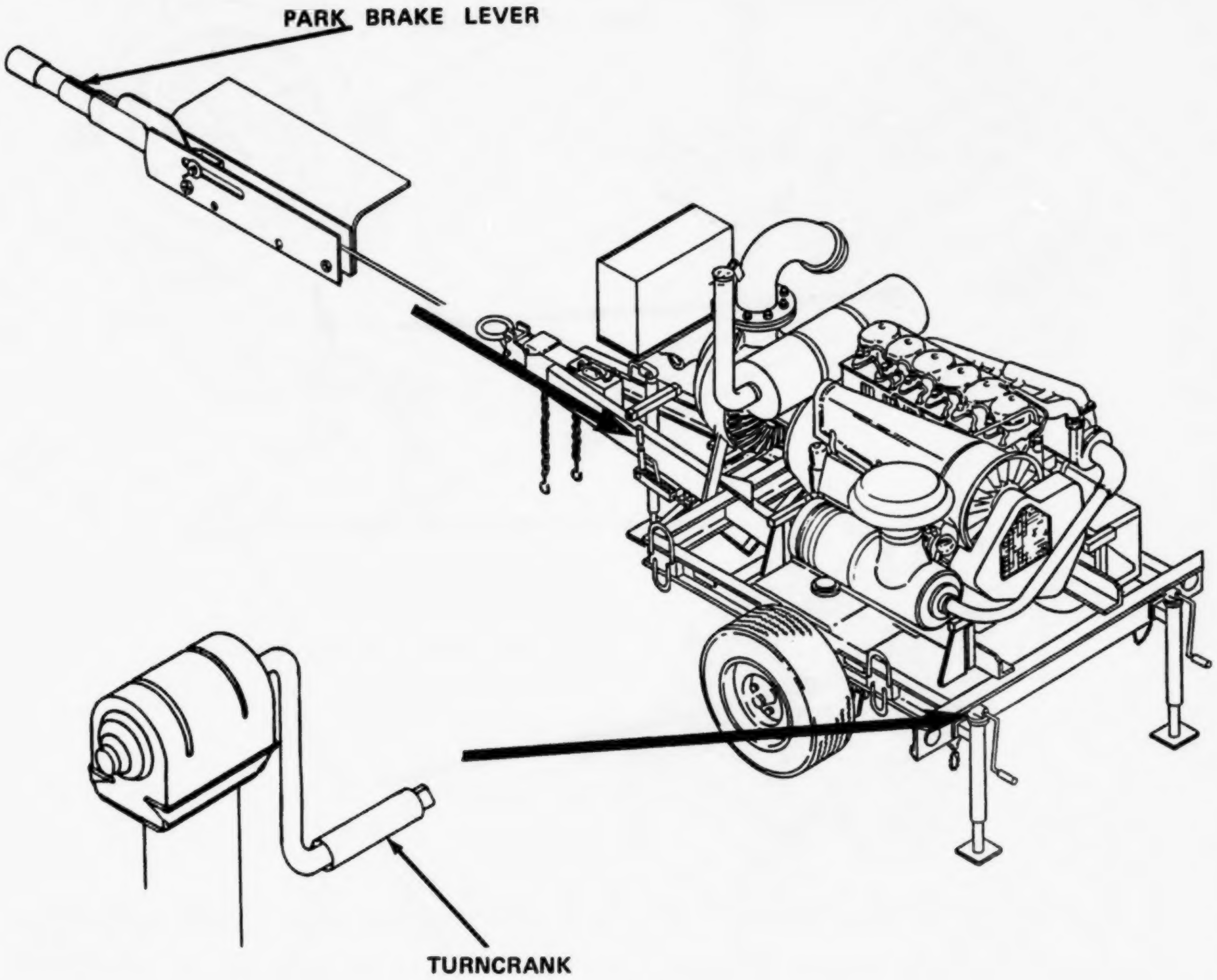
Pump Assembly Control Panel: US636HCCD-1 (Cont)


PUMP DISCHARGE
PUMP SUCTION
ENGINE CONTROLS
START/STOP
PULL TO START
PUSH TO STOP
START
MODE SWITCH
MANUAL
NORMAL
FUSE
MANUAL THROTTLE INCREASE
IDLE
HIGH
ENGINE OPERATION INSTRUCTIONS
MANUAL
NORMAL
ENGINE AMMETER
ENGINE TACHOMETER/HOURMETER
ENGINE OIL PRESSURE
ENGINE AMMETER
ENGINE TACHOMETER/HOURMETER

Control or Indicator	Function
ENGINE TACHOMETER/ HOURMETER	Tachometer shows engine rpm. Range is 4 to 30 (X 100) rpm. Hourmeter shows amount of time engine has operated. Displays hours and tenths of an hour.
ENGINE AMMETER	Indicates rate of electric output by alternator. Range is -60 to +60 amp.

2-1. OPERATOR'S CONTROLS AND INDICATORS (CONT)

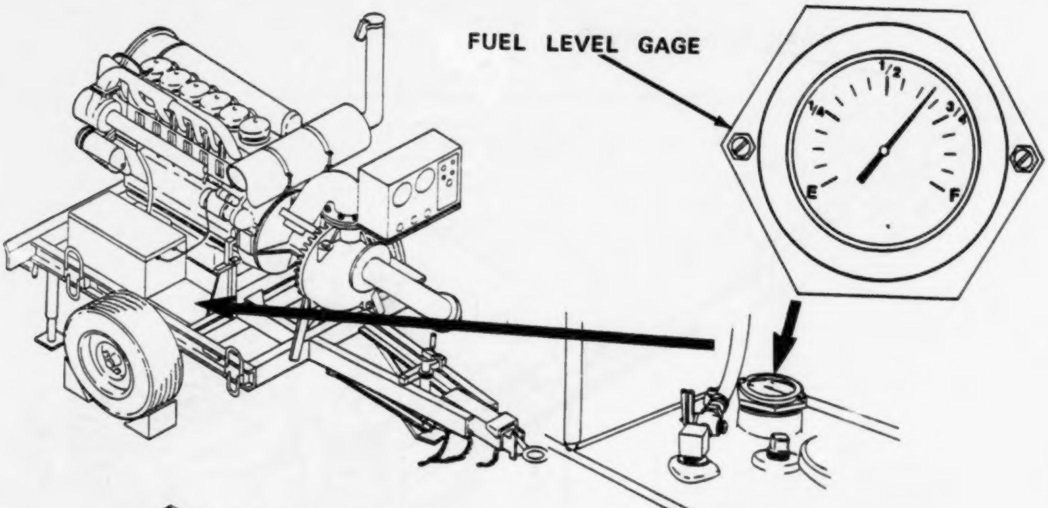
Trailer-Mounted Pump Assembly: US636HCCD-1

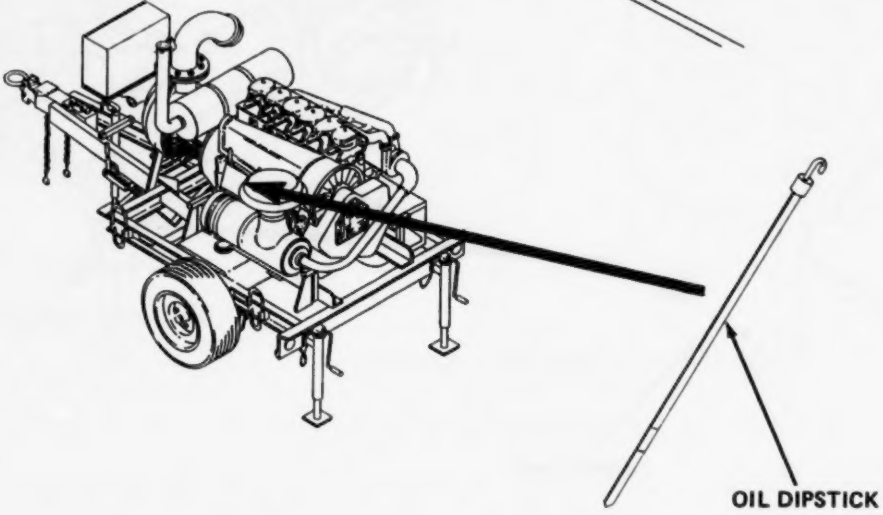


Control or Indicator	Function
Turncrank	Used to raise and lower front tripod and jacks to level trailer-mounted pump assembly.
Park Brake Lever	Used to lock wheels when trailer assembly is parked. Pull lever towards front of trailer to lock wheels. End cap on lever used to adjust brake cable tension.

2-1. **OPERATOR'S CONTROLS AND INDICATORS** (CONT)

Trailer-Mounted Pump Assembly: US636HCCD-1 (Cont)

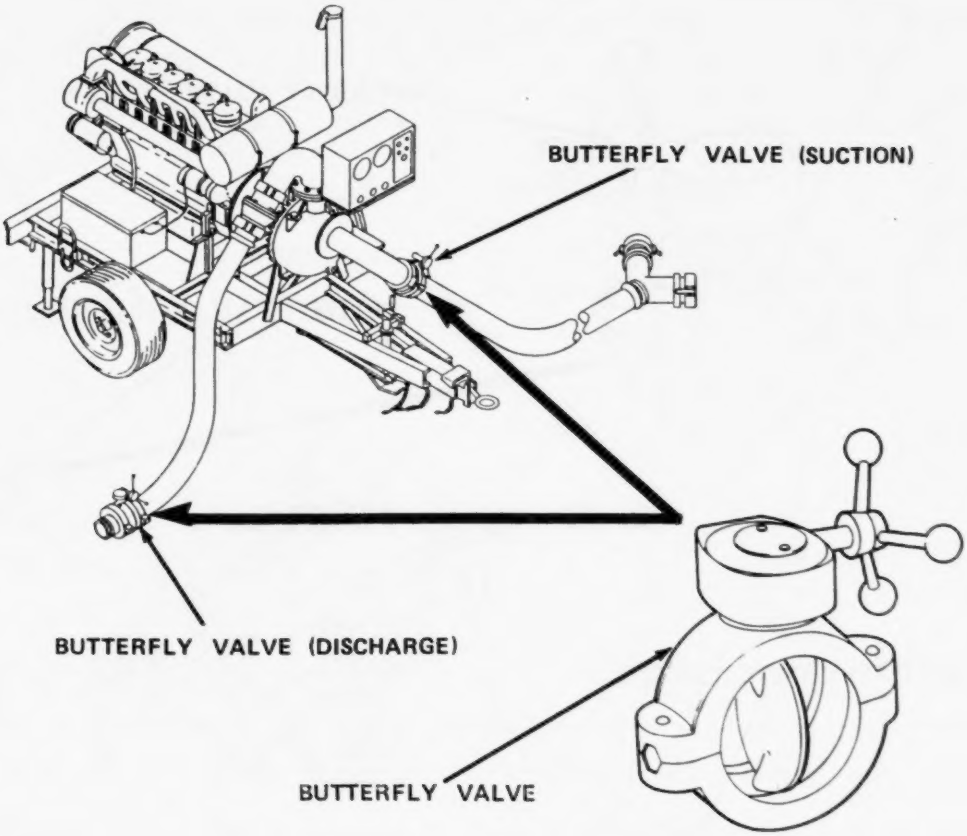




Control or Indicator	Function
Fuel Level Gage	Indicates amount of fuel in tank. Range is E (empty) to F (full).
Oil Dipstick	Used to determine level of oil in crankcase. Dipstick is marked with two lines, the lower mark meaning add oil and the upper mark meaning full.

2-1. OPERATOR'S CONTROLS AND INDICATORS (CONT)

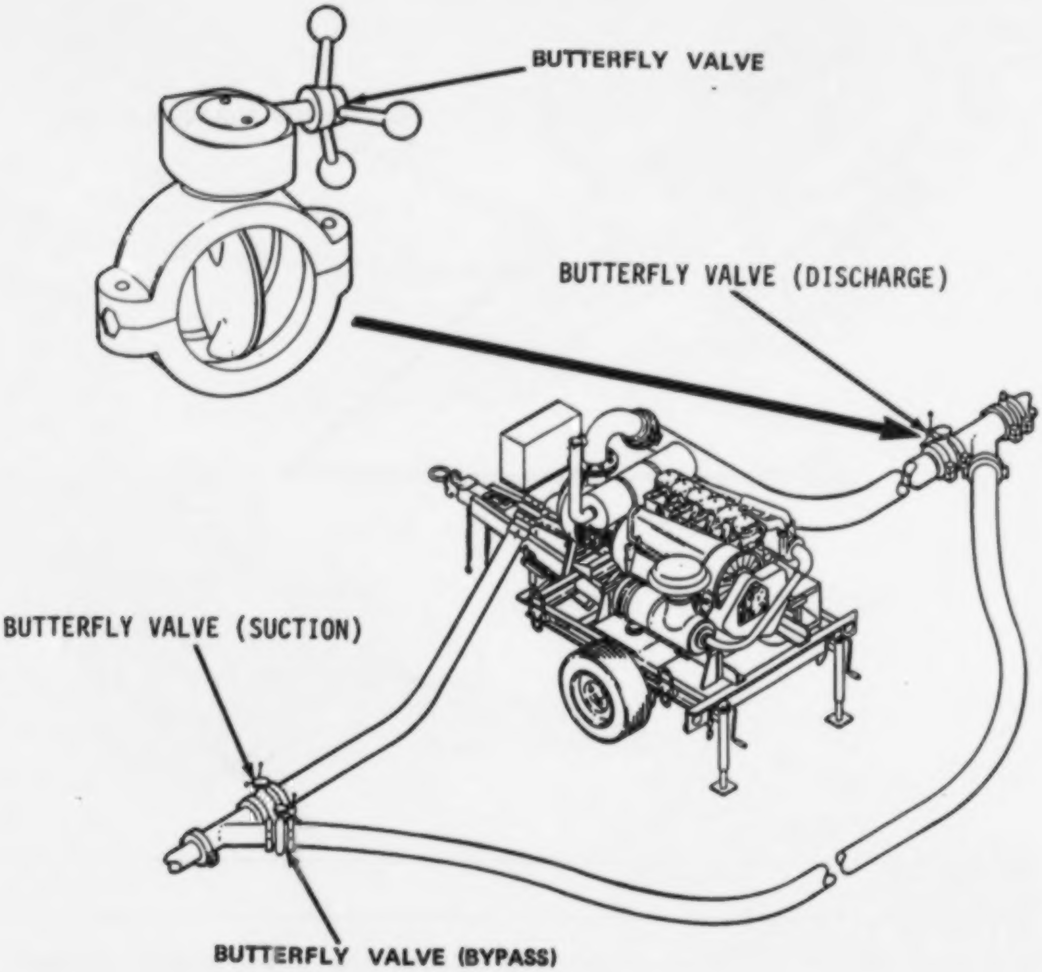
Lead Pumping Station


BUTTERFLY VALVE (SUCTION)
BUTTERFLY VALVE (DISCHARGE)
BUTTERFLY VALVE

Control or Indicator	Function
Butterfly Valve (Suction)	Open to route waterflow from water source through pump. Close to shut off pump from water source.
Butterfly Valve (Discharge)	Open to allow water to flow downline. Close to shut off downline waterflow.

2-1. OPERATOR'S CONTROLS AND INDICATORS (CONT)

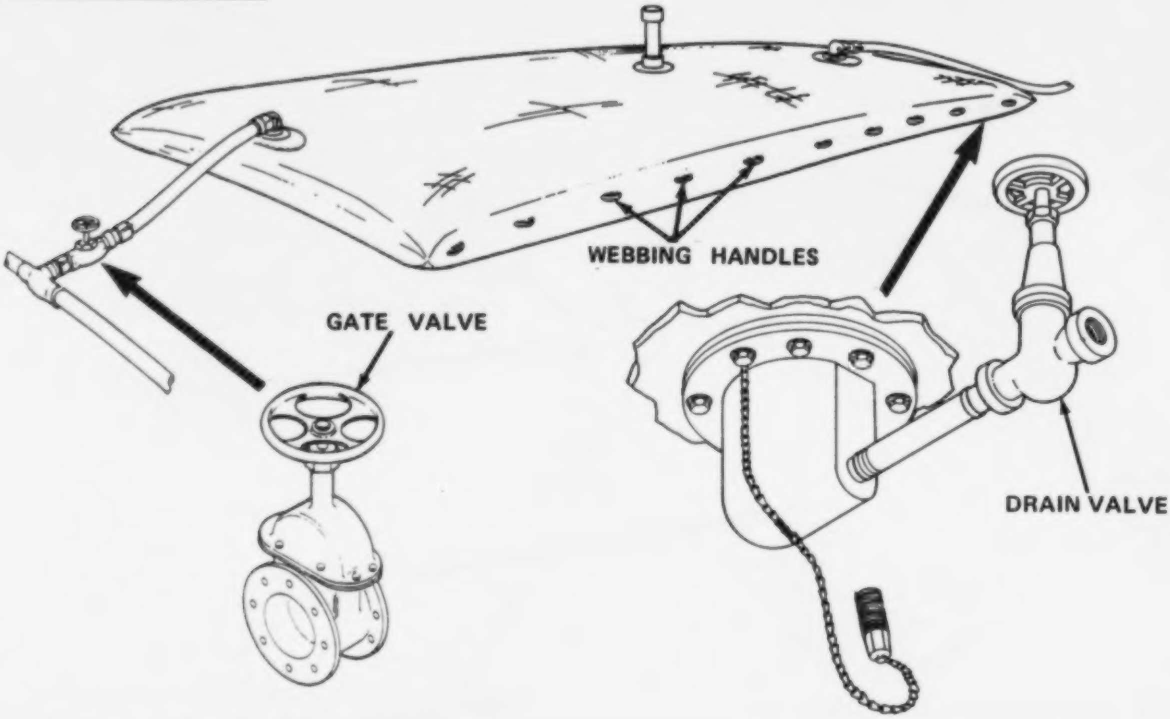
Boost Pumping Stations


BUTTERFLY VALVE
BUTTERFLY VALVE (DISCHARGE)
BUTTERFLY VALVE (SUCTION)
BUTTERFLY VALVE (BYPASS)

Control or Indicator	Function
Butterfly Valves (Suction and Discharge)	Open to route waterflow through pump. Close to shut off pump from waterflow.
Butterfly Valve (Bypass)	Close to shut off bypass hose. Open to route water through bypass hose.

2-1. OPERATOR'S CONTROLS AND INDICATORS (CONT)

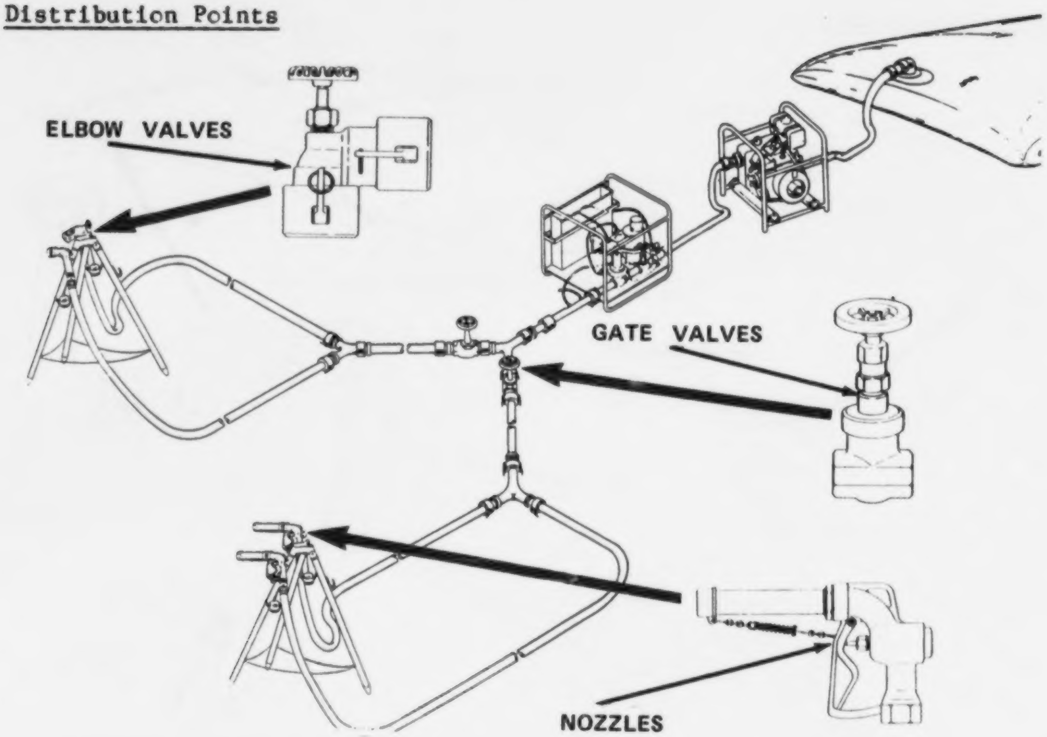
Storage Assemblies


WEBBING HANDLES
GATE VALVE
DRAIN VALVE

Control or Indicator	Function
Gate Valve	Used to control flow of water to storage tank.
Drain Valve	Used to open or close drain assembly on storage tank.
Webbing Handles	Used to position storage tank before filling.

2-1. OPERATOR'S CONTROLS AND INDICATORS (CONT)

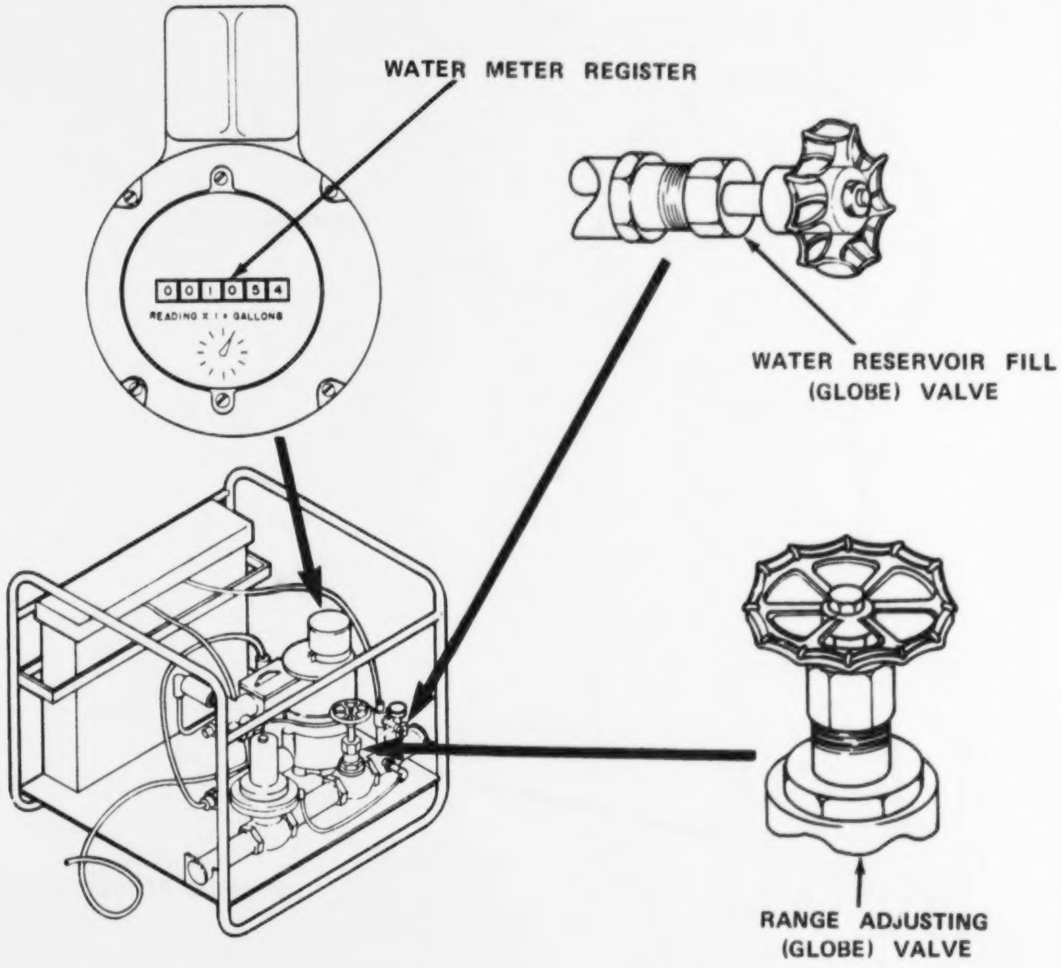
Distribution Points



Control or Indicator	Function
Gate Valves	Used to control flow of water to manual dispersing stations.
Elbow Valves	Used to control flow of water at manual dispersing station when attached to hose end.
Nozzles	Used to control flow of water at manual dispersing station when attached to hose end.

2-1. OPERATOR'S CONTROLS AND INDICATORS (CONT)

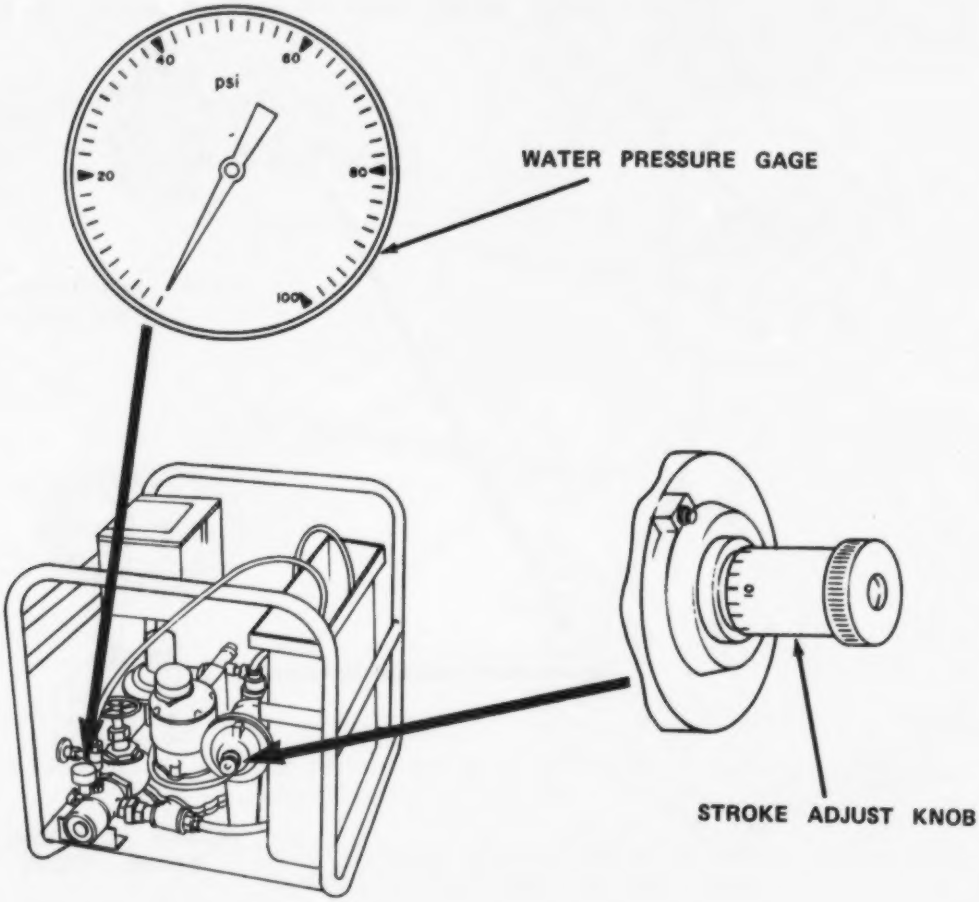
Hypochlorination Unit: 1955-1


WATER METER REGISTER
001054
READING X 1 = GALLONS
WATER RESERVOIR FILL (GLOBE) VALVE
RANGE ADJUSTING (GLOBE) VALVE

Control or Indicator	Function
Water Meter Register	Displays amount of water flowing through hypochlorinator up to 999,999 gal.
Water Reservoir Fill (Globe) Valve	Opened to fill plastic reservoir with water.
Range Adjusting (Globe) Valve	Used to control flow of water through system.

2-1. OPERATOR'S CONTROLS AND INDICATORS (CONT)

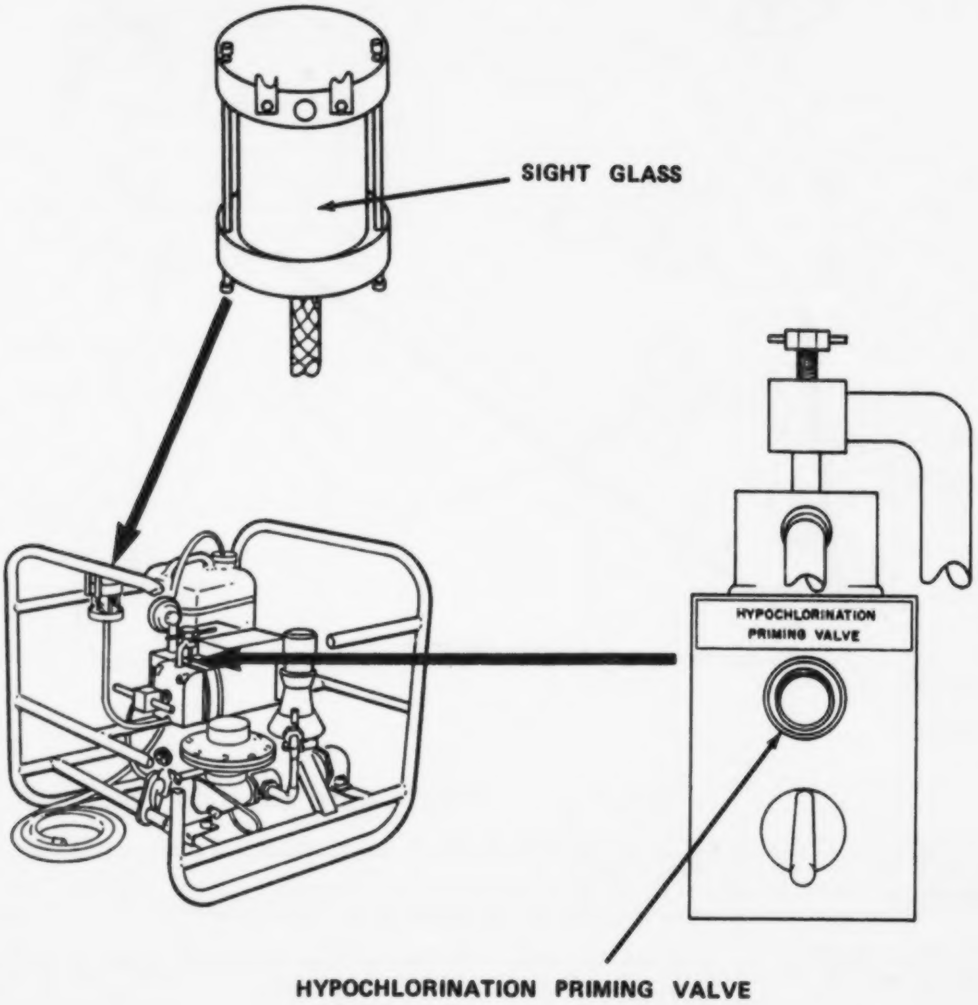
Hypochlorination Unit: 1955-1 (Cont)


40
60
psi
20
80
100
WATER PRESSURE GAGE
10
STROKE ADJUST KNOB

Control or Indicator	Function
Water Pressure Gage	Displays operating water pressure. Range is 0 to 100 psi.
Stroke Adjust Knob	Used to set stroke length of impulse diaphragm. Determines amount of solution pumped per stroke. Micrometer barrel scale is marked 0 to 10. Stroke adjustment thimble is marked 0 to 20.

2-1. OPERATOR'S CONTROLS AND INDICATORS (CONT)

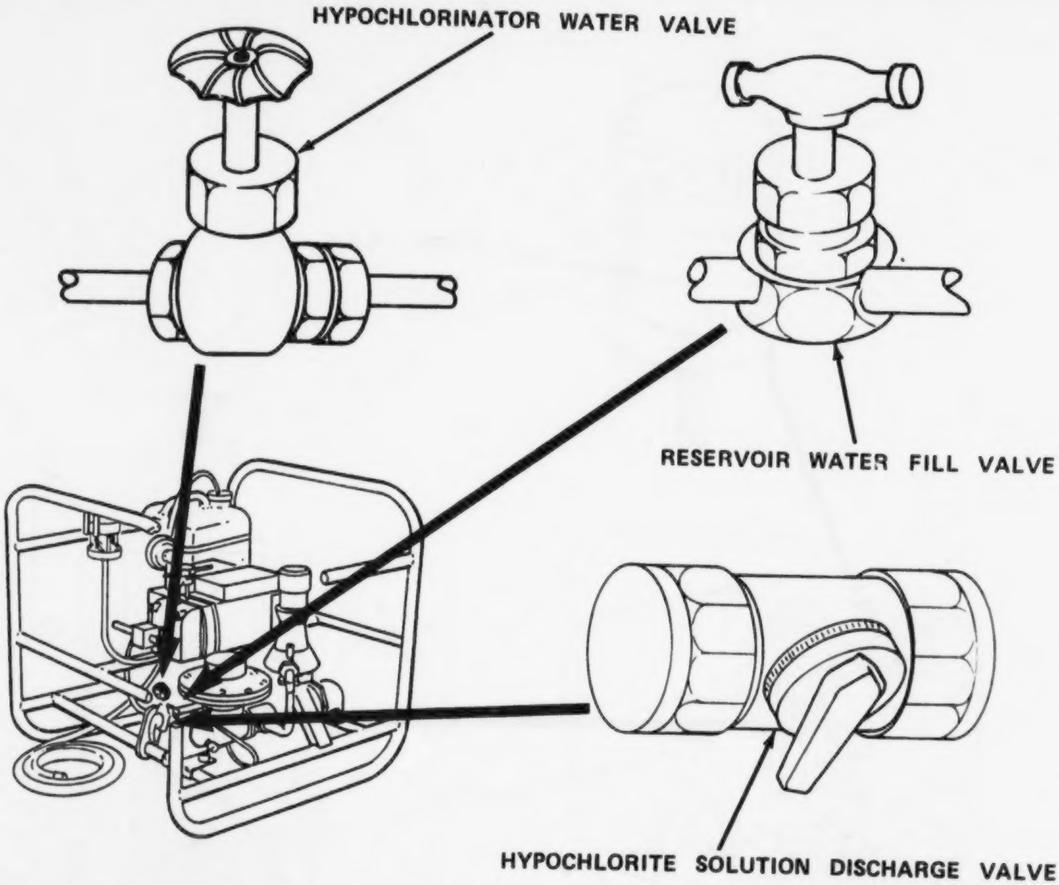
Hypochlorination Unit: A-506131


SIGHT GLASS
HYPOCHLORINATION PRIMING VALVE
HYPOCHLORINATION PRIMING VALVE

Control or Indicator	Function
Sight Glass	Allows operator to see solution being pumped by hypochlorinator.
HYPOCHLORINATION PRIMING VALVE	Used to prime hypochlorinator by removing trapped air in valves and pumping chambers.

2-1. OPERATOR'S CONTROLS AND INDICATORS (CONT)

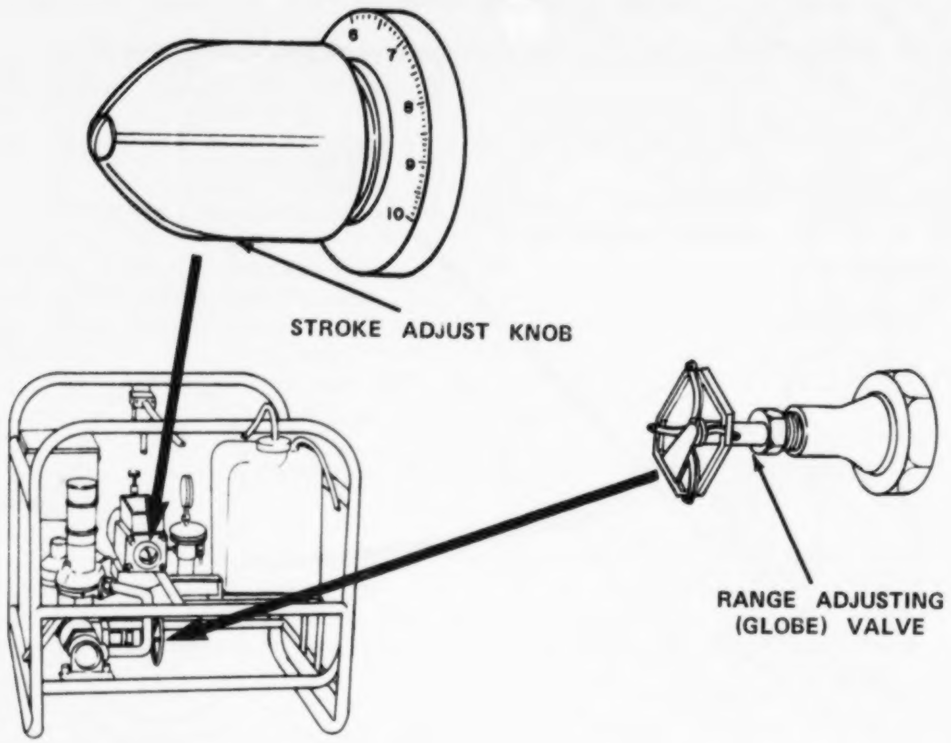
Hypochlorination Unit: A-506131 (Cont)


HYPOCHLORINATOR WATER VALVE
RESERVOIR WATER FILL VALVE
HYPOCHLORITE SOLUTION DISCHARGE VALVE

Control or Indicator	Function
HYPOCHLORINATOR WATER VALVE	Closed to shut off waterflow through hypochlorinator when maintenance is required.
RESERVOIR WATER FILL VALVE	Opened to fill plastic reservoir with water.
HYPOCHLORITE SOLUTION DISCHARGE VALVE	Opened to admit solution into water line.

2-1. OPERATOR'S CONTROLS AND INDICATORS (CONT)

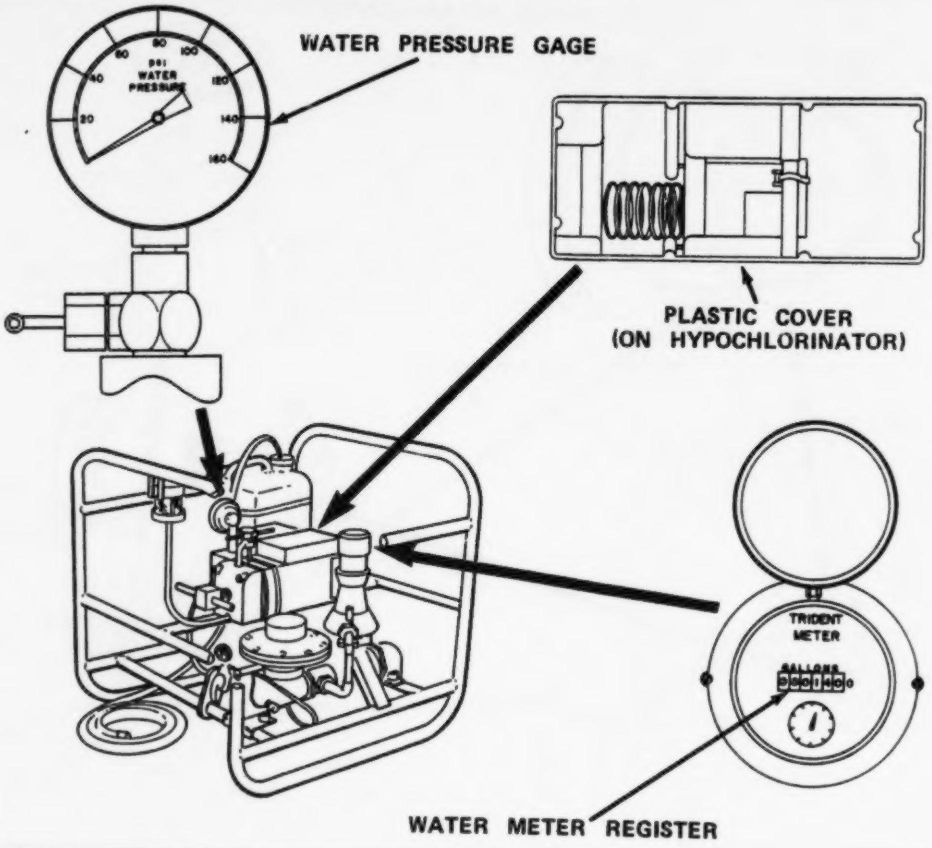
Hypochlorination Unit: A-506131 (Cont)


6
7
8
9
10
STROKE ADJUST KNOB
RANGE ADJUSTING
(GLOBE) VALVE

Control or Indicator	Function
STROKE ADJUST Knob	Used to set stroke length of pumping shaft. Determines amount of solution pumped per stroke.
Range Adjusting (Globe) Valve	Used to control flow of water through bypass line. Governs speed of hypochlorinator.

2-1. OPERATOR'S CONTROLS AND INDICATORS (CONT)

Hypochlorination Unit: A-506131 (Cont)


WATER PRESSURE GAGE
20
40
60
80
100
120
140
160
PSI
WATER
PRESSURE
PLASTIC COVER
(ON HYPOCHLORINATOR)
TRIDENT
METER
GALLONS
WATER METER REGISTER

Control or Indicator	Function
Water Pressure Gage	Shows hypochlorinator operating water pressure. Range is 0 to 160 psi.
Plastic Cover (on hypochlorinator)	Allows operator to determine if cam, cam roller, and spring in hypochlorinator are working.
Water Meter Register	Numbers on register indicate gallons of water flowing through bypass line up to 999,999 gal. Dial at bottom of register indicates number of strokes per 10 gal. of water.

Section II. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

2-2. GENERAL

a. Before You Operate. Always keep in mind the CAUTIONS and WARNINGS. Perform your before (B) PMCS.

b. While You Operate. Always keep in mind the CAUTIONS and WARNINGS. Perform your during (D) PMCS.

c. After You Operate. Be sure to perform your after (A) PMCS.

d. If Your Equipment Fails To Operate. Troubleshoot in accordance with Table 3-1. Report any deficiencies using proper forms. Refer to DA Pam 738-750.

2-3. PMCS PROCEDURES

a. The PMCS table lists the inspections and care of equipment required to keep it in good operating condition.

b. The Interval column of the PMCS table indicates when to do a certain check or service.

c. The Item to Be Inspected Procedure column of the PMCS table indicates what to inspect and how to do the required checks and services. Carefully follow these instructions. If directed by the procedure, or if required tools are not available, have organizational maintenance do the work.

d. If equipment does not perform as required, notify organizational maintenance. Report any malfunctions or failures on DA Form 2404, or refer to DA Pam 738-750.

e. If the PMCS table requires removal of assemblies or equipment, refer to the maintenance paragraph listed.

f. The Equipment Is Not Ready/Available If column indicates when and why equipment cannot be used.

NOTE

Both terms "ready/available" and "mission capable" indicate equipment is on hand and is able to perform its combat missions. (See DA Pam 738-750.)

NOTE

- Leakage for operator/crew PMCS shall be classified as follows:

Class I	Seepage of fluid (as indicated by wetness or discoloration) not great enough to form drops.
Class II	Leakage of fluid great enough to form drops but not enough to cause drops to drip from item being checked/inspected.
Class III	Leakage of fluid great enough to form drops that fall from the item being checked/ inspected.

Table 2-1. Preventive Maintenance Checks and Services

CAUTION

- Equipment operation is allowable with minor leakages (Class I or II). (See note below.) Of course, fluid capacity must be considered in the item/system being checked/inspected. When in doubt, notify supervisor.
- When operating with Class I or Class II leaks, continue to check fluid levels as required in PMCS.
- Class III leaks should be reported to supervisor or organizational maintenance.

NOTE

- If the equipment must be kept in continuous operation, check and service only those items that can be checked and serviced without disturbing operation. Make the complete checks and services when the equipment can be shut down.
- Perform weekly and before operation PMCS if:

  (1) The assigned operator has not operated the item since last weekly PMCS.

  (2) Operation of the item is the first time.
- The Item No. column is used as source of item numbers for the TM Number column on DA Form 2404, Equipment Inspection and Maintenance Worksheet, in recording results of PMCS.

Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation D - During Operation A - After Operation

W - Weekly

Item No.	Interval B	D	A	W	Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
					TRAILER-MOUNTED PUMP ASSEMBLY (UNIT 609)	
1	•	•	•		**Engine.** Inspect ground for evidence of leaks. If leaks are present, notify organizational maintenance.	Any evidence of leaks on ground.
2	•				**Trailer Chassis.** Inspect all frame seam welds for damage. If welds are damaged, notify organizational maintenance. Check axle, lunette, and springs for damage. If axle or spring is damaged, notify organizational maintenance.	Welds are damaged. Axle, lunette, or spring is damaged.

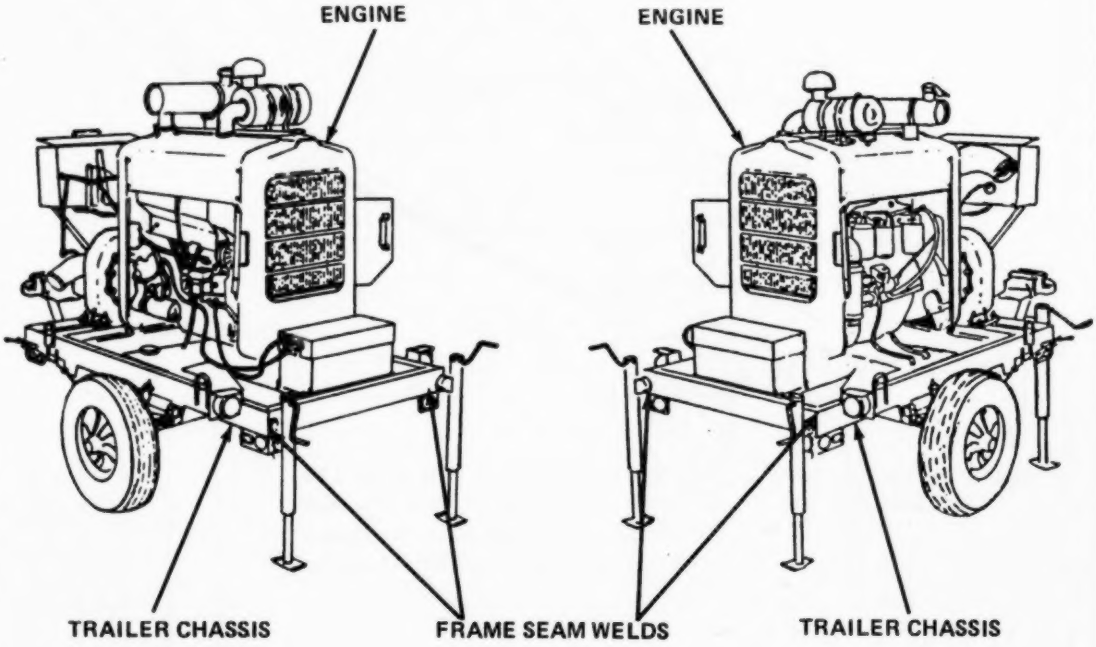


Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation D - During Operation A - After Operation

W - Weekly

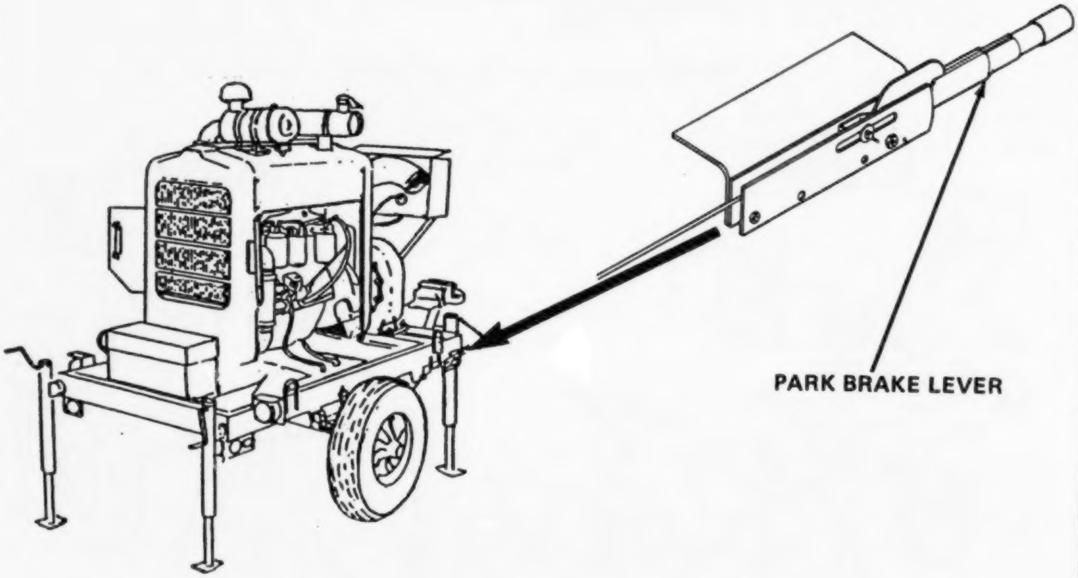
Item No.	Interval				Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
	B	D	A	W		
					TRAILER-MOUNTED PUMP ASSEMBLY (UNIT 609)  	
3	•				**Park Brakes.** Check that levers on both sides of pump assembly are locked. Check for proper adjustment. Adjust as needed (para 3-8).	Park brakes are not locked or properly adjusted.

Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation D - During Operation A - After Operation

W - Weekly

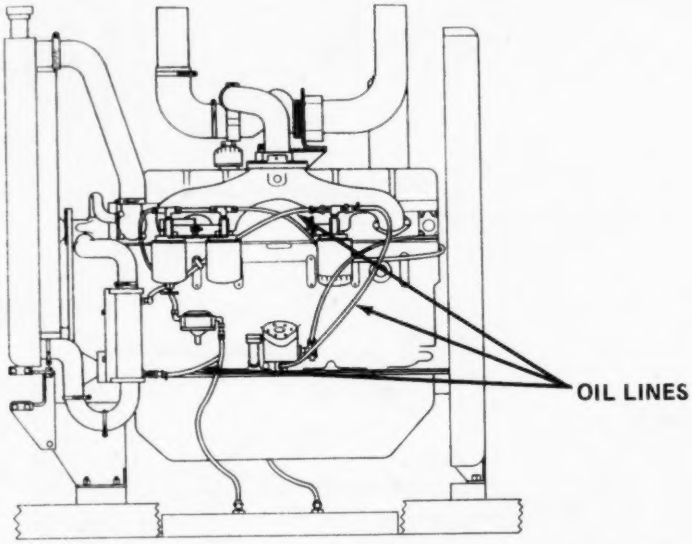
Item No.	Interval				Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
	B	D	A	W		
					TRAILER-MOUNTED PUMP ASSEMBLY (UNIT 609) 	
4	●	●	●		**Oil Lines.** Inspect lines for damage and leaks. If line is damaged or leaking, notify organizational maintenance.	Oil line is damaged or leaking.

Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation D - During Operation A - After Operation

W - Weekly

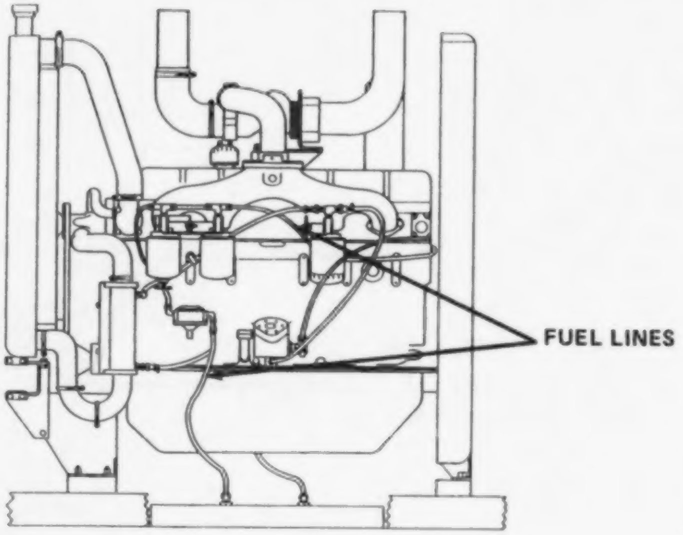
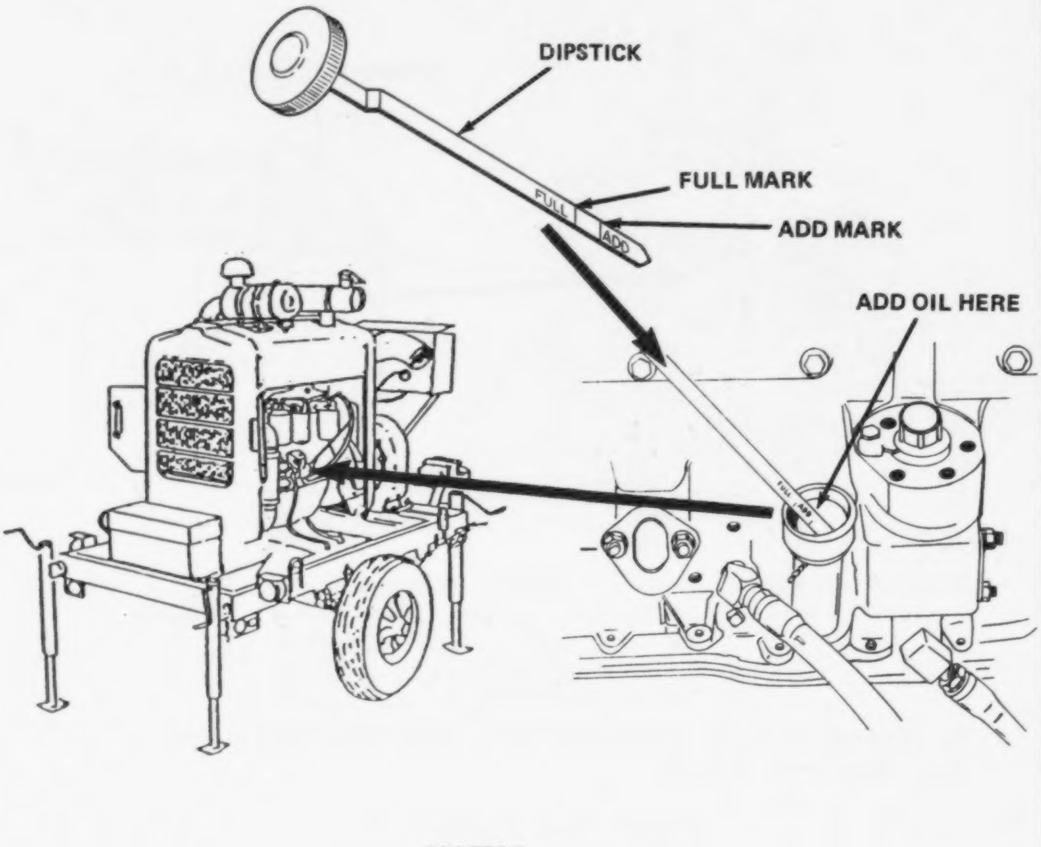
Item No.	Interval				Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
	B	D	A	W		
					TRAILER-MOUNTED PUMP ASSEMBLY (UNIT 609) 	
5	●	●	●		**Fuel Lines.** Inspect lines for damage and leaks. If line is damaged or leaking, notify organizational maintenance.	Fuel line is damaged or leaking.

Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation D - During Operation A - After Operation

W - Weekly

Item No.	Interval B	D	A	W	Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
					TRAILER-MOUNTED PUMP ASSEMBLY (UNIT 609)	



CAUTION

To avoid damaging engine, DO NOT overfill crankcase with oil. Oil level should never be above FULL line on dipstick.

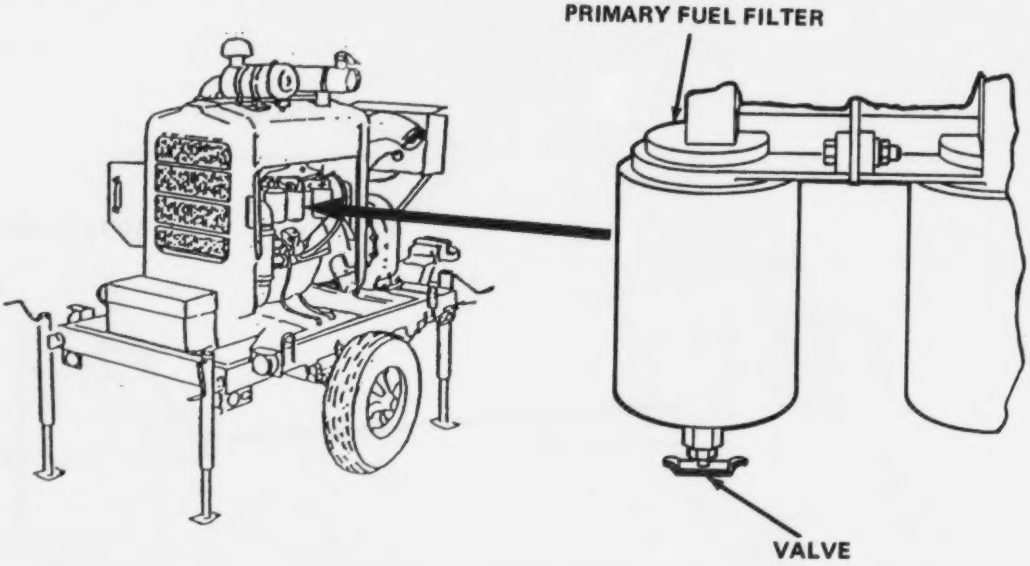
Item No.	B	D	A	W	Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
6	●		●		**Oil Level.** Check level. Add oil (MIL-L-2104) as necessary to FULL mark on dipstick.	Oil level is below ADD line on dipstick.

Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation D - During Operation A - After Operation

W - Weekly

Item No.	Interval				Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
	B	D	A	W		
					TRAILER-MOUNTED PUMP ASSEMBLY (UNIT 609)	



WARNING

To prevent fire or explosion, keep open flame and sparks away from fuel filter.

Item No.	B	D	A	W	Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
7	●				**Primary Fuel Filter.** Open valve on bottom and drain water and sediment. Close valve when fuel starts coming through outlet.	

Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation D - During Operation A - After Operation

W - Weekly

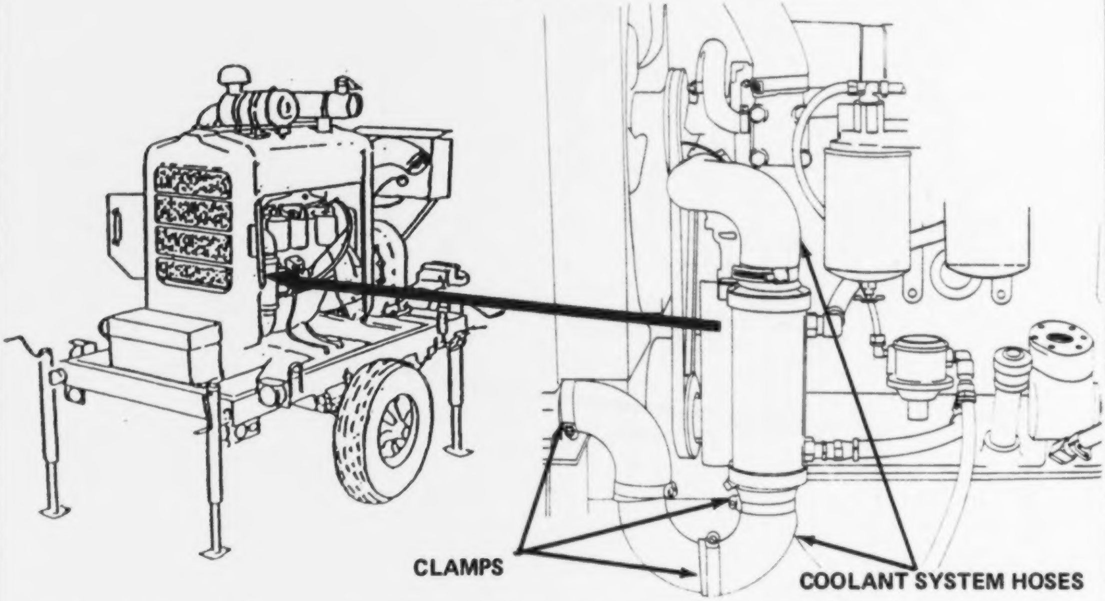
Item No.	Interval				Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
	B	D	A	W		
					TRAILER-MOUNTED PUMP ASSEMBLY (UNIT 609)  	
8	●		●		**Cooling System Hoses.** Inspect for cracks, damage, and leaks. Make sure hose clamps are secure. If hose is damaged or clamps are loose, notify organizational maintenance.	Hose is damaged or clamps loose.

Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation D - During Operation A - After Operation

W - Weekly

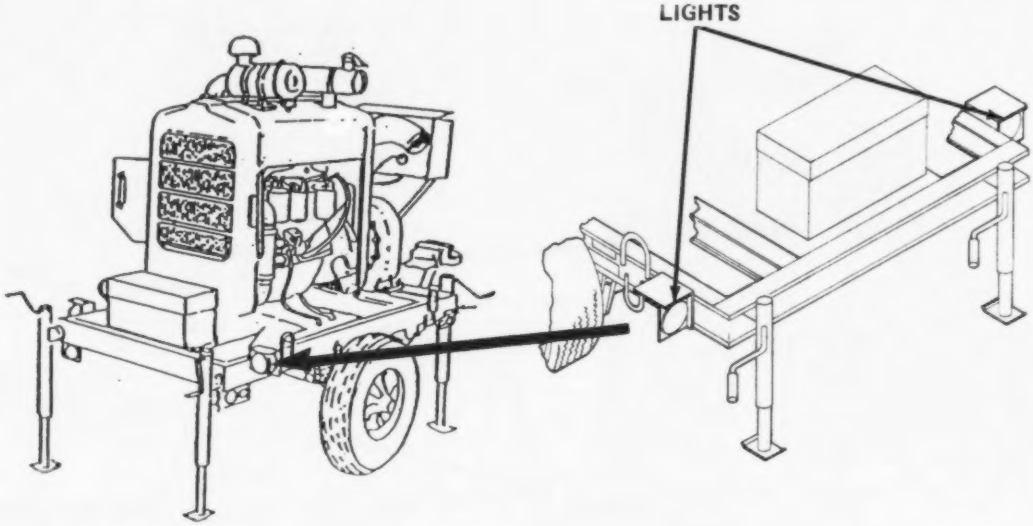
Item No.	Interval				Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
	B	D	A	W		
					TRAILER-MOUNTED PUMP ASSEMBLY (UNIT 609)	
						
9				●	**Lights.** Check for cracked or broken lenses. If lens is cracked or broken, notify organizational maintenance.	

Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation D - During Operation A - After Operation

W - Weekly

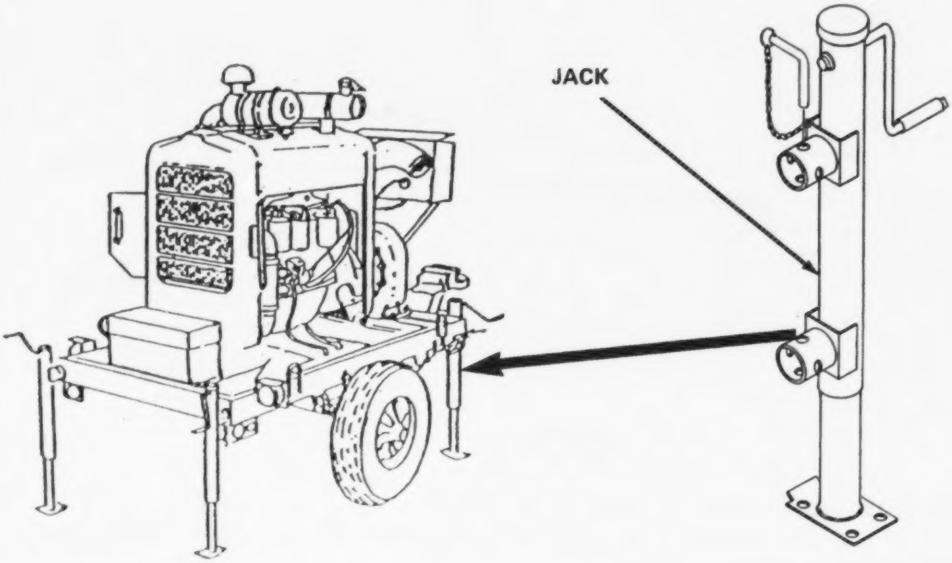
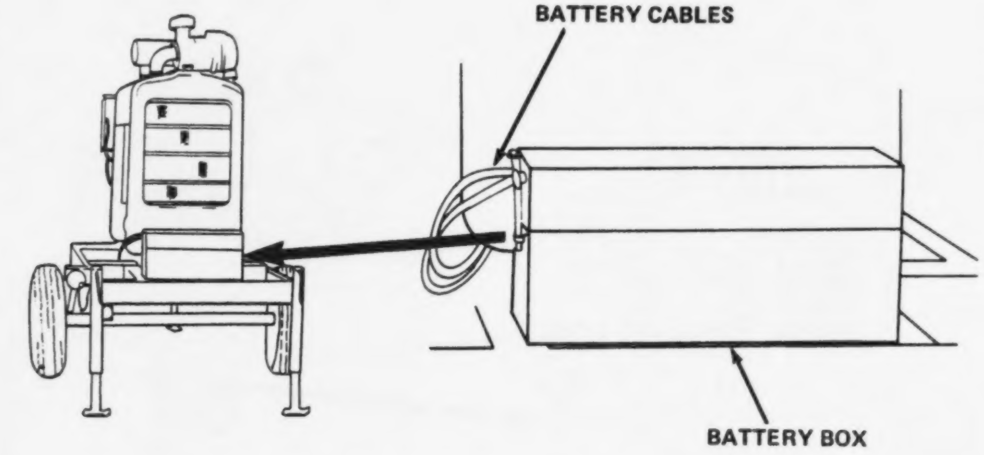
Item No.	Interval				Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
	B	D	A	W		
					TRAILER-MOUNTED PUMP ASSEMBLY (UNIT 609) 	
10	●				**Jacks.** Check to see if jack is damaged. Make sure jack is secured and operable. If jack is damaged, or not secured or operable, nofity supervisor.	Jack is damaged, or not secure or operable.

Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation D - During Operation A - After Operation

W - Weekly

Item No.	Interval				Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
	B	D	A	W		
					TRAILER-MOUNTED PUMP ASSEMBLY (UNIT 609)	



WARNING

- DANGER OF EXPLOSION: Fumes from battery acid may cause explosion. To prevent explosion, keep sparks and open flame away from battery acid.
- CAUSTIC CHEMICALS: Use rubber gloves to avoid burns from battery acid. If acid gets on skin or into eyes, wash with water right away. Seek medical help.

Item No.	B	D	A	W	Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
11	●				**Battery.** Inspect cable connections. Check fluid level (para 3-5). Clean or service as necessary.	Cable connection is loose or corroded. Fluid level is low.

Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation   D - During Operation   A - After Operation

W - Weekly

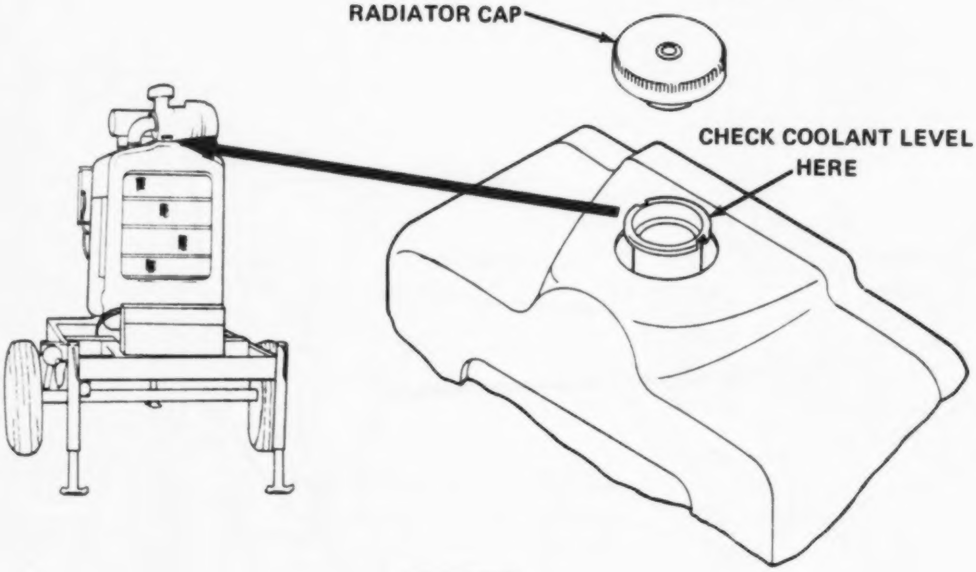
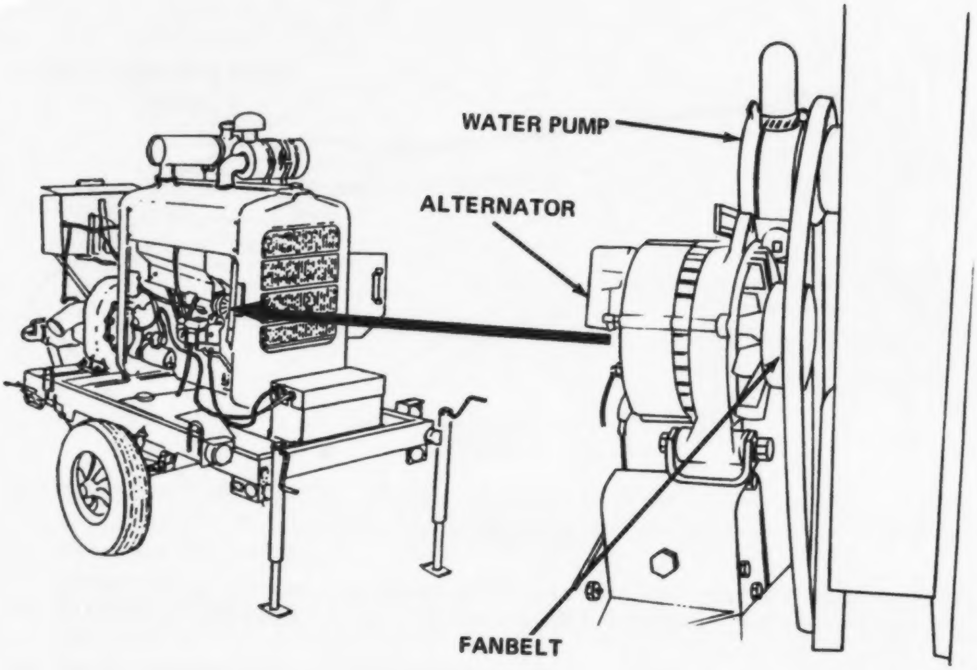
<table>
<tr><th rowspan="2">Item No.</th><th colspan="4">Interval</th><th rowspan="2">Item to Be Inspected
Procedure</th><th rowspan="2">Equipment Is Not Ready/Available If:</th></tr>
<tr><th>B</th><th>D</th><th>A</th><th>W</th></tr>
<tr><td colspan="7">TRAILER-MOUNTED PUMP ASSEMBLY
(UNIT 609)</td></tr>
<tr><td colspan="7">
</td></tr>
<tr><td colspan="7">WARNING
Allow engine to cool before removing radiator cap to avoid being scalded by heated coolant. Open cap slowly to relieve pressure.</td></tr>
<tr><td>12</td><td>●</td><td></td><td></td><td></td><td>**Radiator.** Check coolant level. Fluid should be visible in radiator reservoir. If coolant level is low, add as needed. Check radiator exterior for damage. Check radiator core for blocked air passages. Clean as necessary (para 3-7). If radiator is damaged, notify organizational maintenance.</td><td>Coolant level is low. Radiator is damaged.</td></tr>
</table>

Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation D - During Operation A - After Operation

W - Weekly

Item No.	Interval				Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
	B	D	A	W		
					TRAILER-MOUNTED PUMP ASSEMBLY (UNIT 609)	



Item No.	Interval				Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
	B	D	A	W		
13	●				**Fanbelt.** Check belt for wear and damage. Check for 1/2 in. deflection at center of belt between water pump and alternator. If belt is worn, damaged, or not properly adjusted, notify organizational maintenance.	Belt is worn, damaged, or not properly adjusted.

Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation D - During Operation A - After Operation

W - Weekly

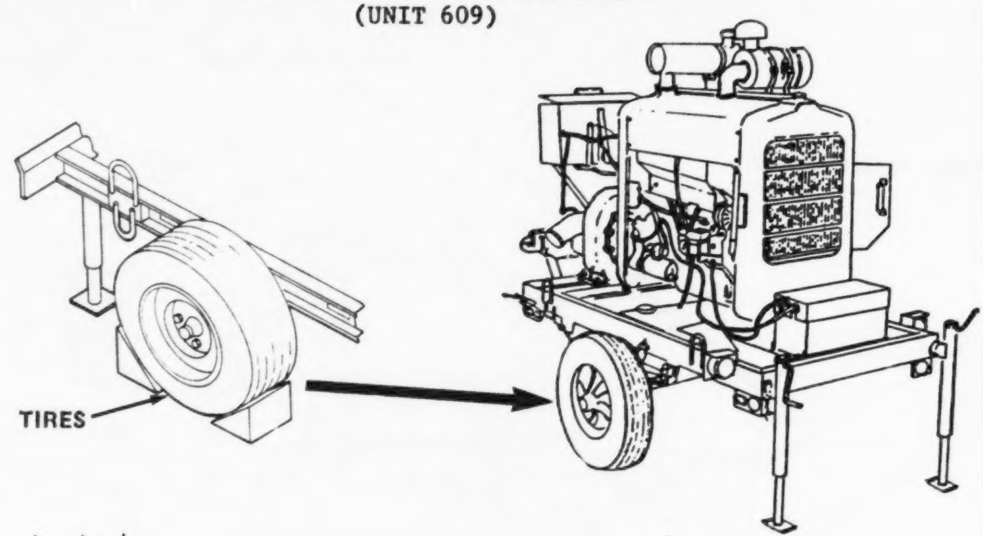
Item No.	Interval B	D	A	W	Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
					TRAILER-MOUNTED PUMP ASSEMBLY (UNIT 609) 	
14				●	**Tires.** Check for damage to rim and tire. If tire or rim is damaged, notify organizational maintenance.	Tire or rim is damaged.

Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation D - During Operation A - After Operation

W - Weekly

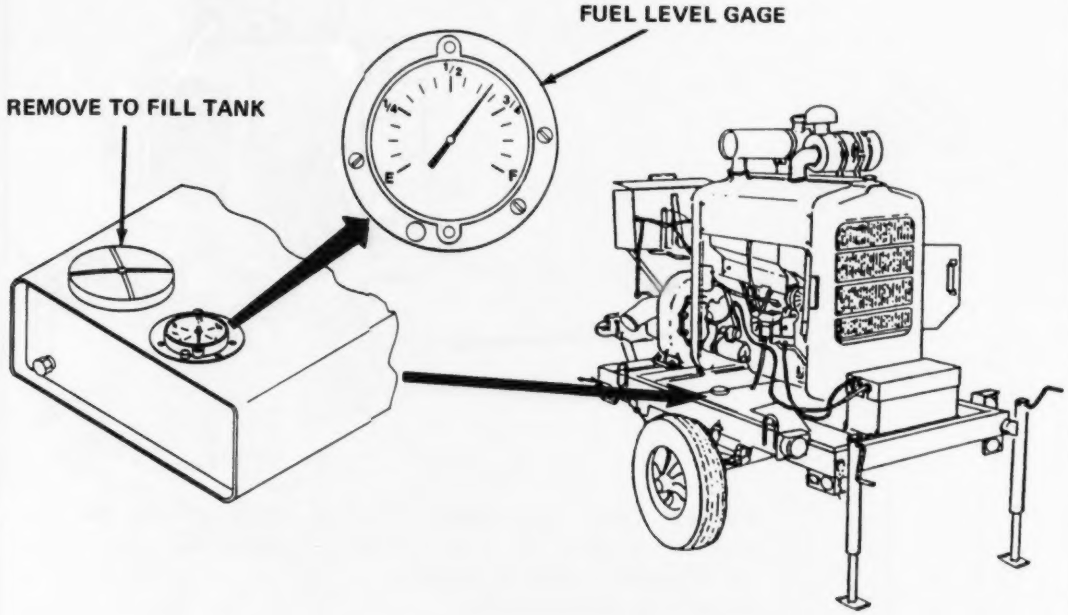
Item No.	Interval				Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
	B	D	A	W		
					TRAILER-MOUNTED PUMP ASSEMBLY (UNIT 609)  FUEL LEVEL GAGE REMOVE TO FILL TANK E 1/4 1/2 3/4 F WARNING To prevent fire or explosion, keep open flame and sparks away from fuel tank. CAUTION To prevent condensation, fill tank after operation.	
15	•	•	•		**Fuel Level.** Before and during operation, check fuel gage and add fuel (VV-F-800) as needed. After operation, fill fuel tank.	Fuel level is low.

Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation D - During Operation A - After Operation

W - Weekly

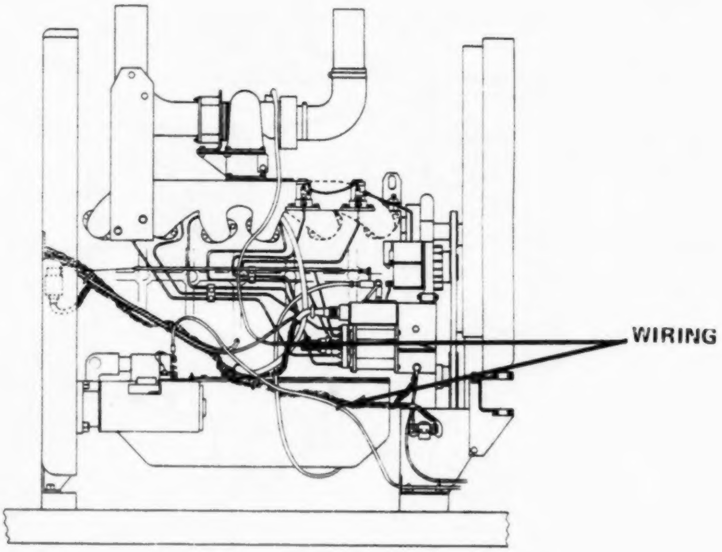
Item No.	Interval				Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
	B	D	A	W		
					TRAILER-MOUNTED PUMP ASSEMBLY (UNIT 609)  	
16	●				**Wiring.** Check for loose or damaged connections. If connection is loose or damaged, notify organizational maintenance.	Connection is damaged or loose.

Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation D - During Operation A - After Operation

W - Weekly

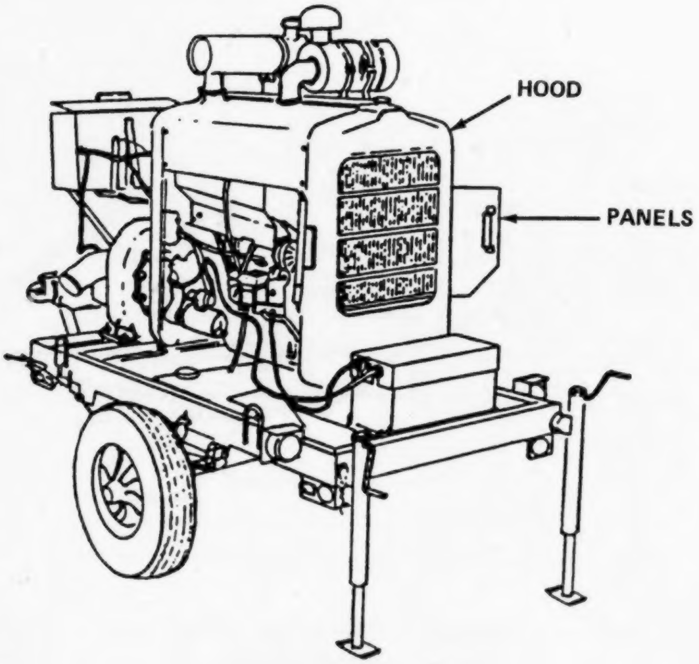
Item No.	Interval				Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
	B	D	A	W		
					TRAILER-MOUNTED PUMP ASSEMBLY (UNIT 609) 	
17	•				**Hood and Panels.** Make sure hood and panels are secure. Check for damaged hinge and fastener on side panels. If hood, panel, or hinge/ fastener is damaged, notify organizational maintenance.	

Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation D - During Operation A - After Operation

W - Weekly

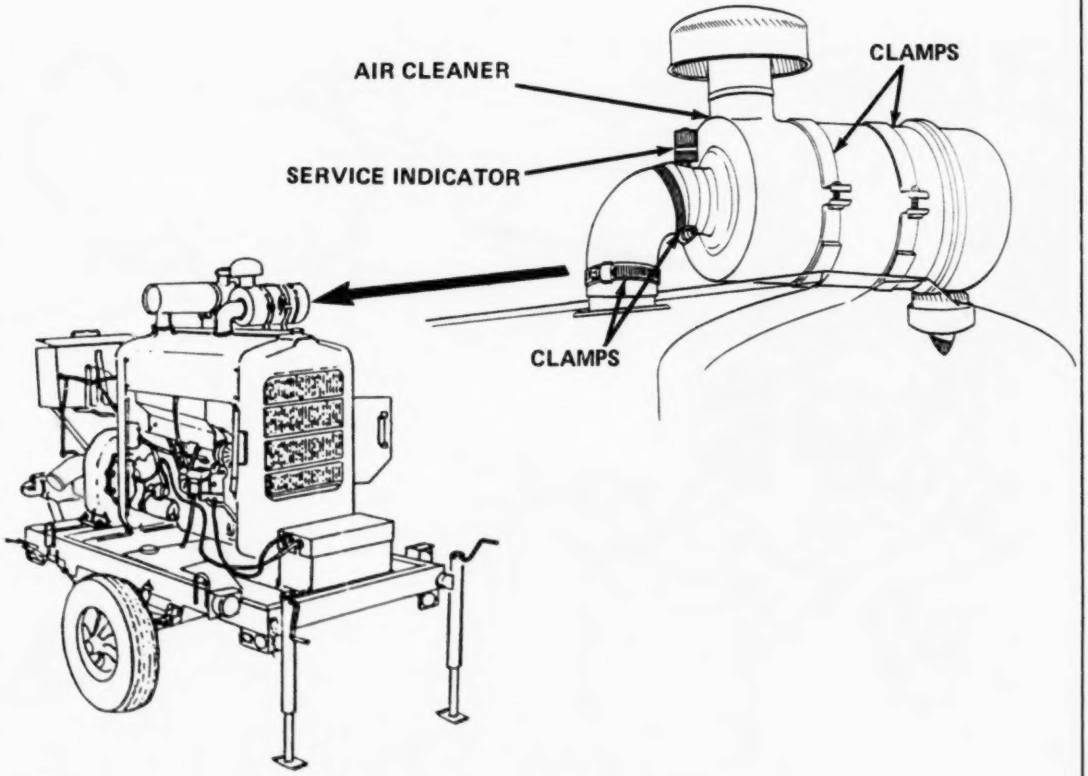
Item No.	Interval				Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
	B	D	A	W		
					TRAILER-MOUNTED PUMP ASSEMBLY (UNIT 609) 	
18	•	•	•		**Air Cleaner.** Before operation, service filter assembly (para 3-6). If service indicator is red, clean filter assembly. Check for and tighten loose clamps. Check for damage. If damage is present, notify organizational maintenance.	Service indicator is red. Damage is present.

Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation D - During Operation A - After Operation

W - Weekly

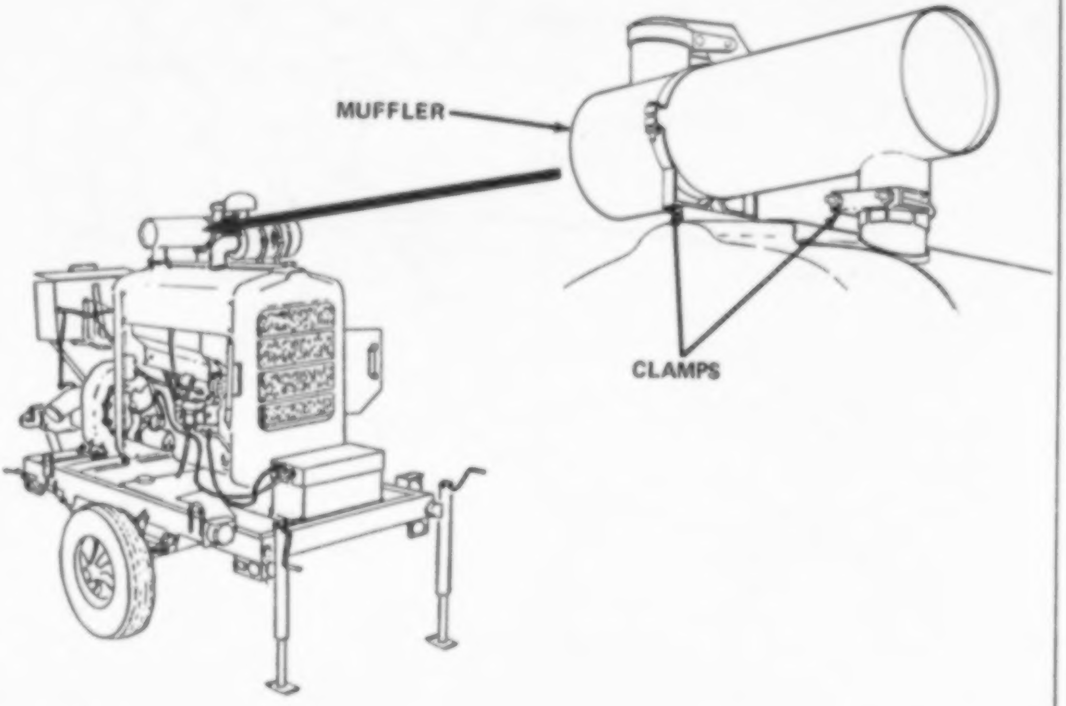
Item No.	Interval				Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
	B	D	A	W		
					TRAILER-MOUNTED PUMP ASSEMBLY (UNIT 609)  	
19	●	●			**Muffler.** Before operation, check for damage and loose clamps. Tighten loose clamps. If muffler is damaged, notify organizational maintenance. During operation, if muffler makes excessive noise, notify organizational maintenance.	Muffler is damaged or clamps loose.

Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation D - During Operation A - After Operation

H - Hourly W - Weekly

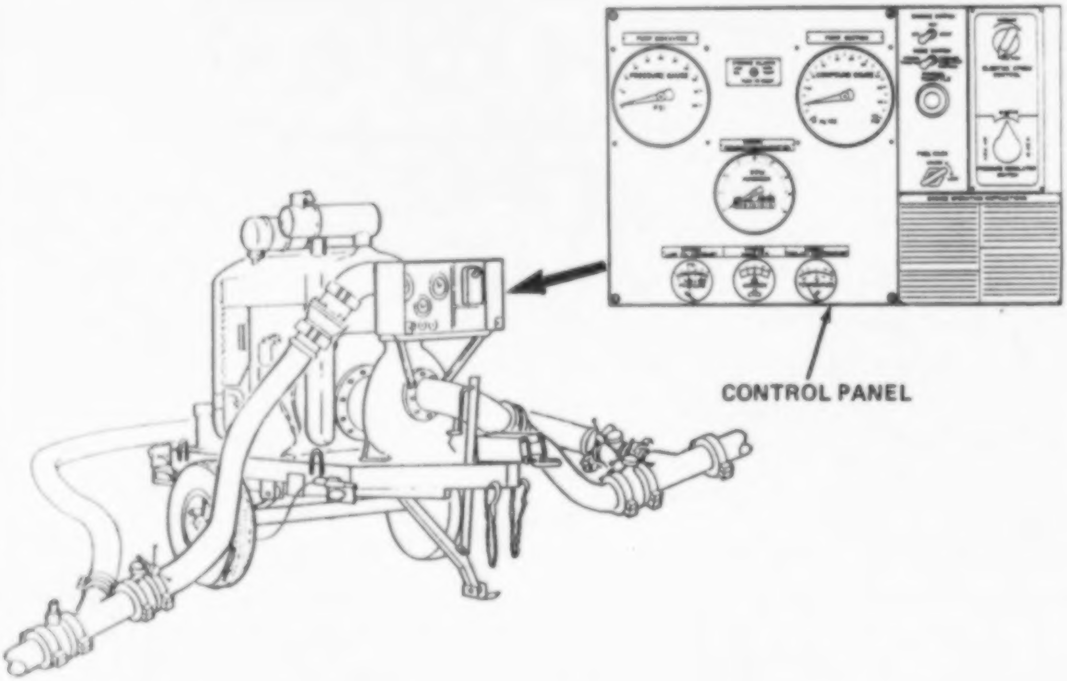
Item No.	Interval					Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
	B	D	A	H	W		
						TRAILER-MOUNTED PUMP ASSEMBLY (UNIT 609) 	
20	•					**Control Panel.** Check gage faces for cracked or broken glass. Check controls for free movement. Check control panel box and cover for damage. Check for damaged hinge or fastener. If gage face is cracked or broken, control binds, or box, cover, or hinge/fastener is damaged, notify organizational maintenance.	Control is binding, or gage face is cracked or broken.

Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation D - During Operation A - After Operation

W - Weekly

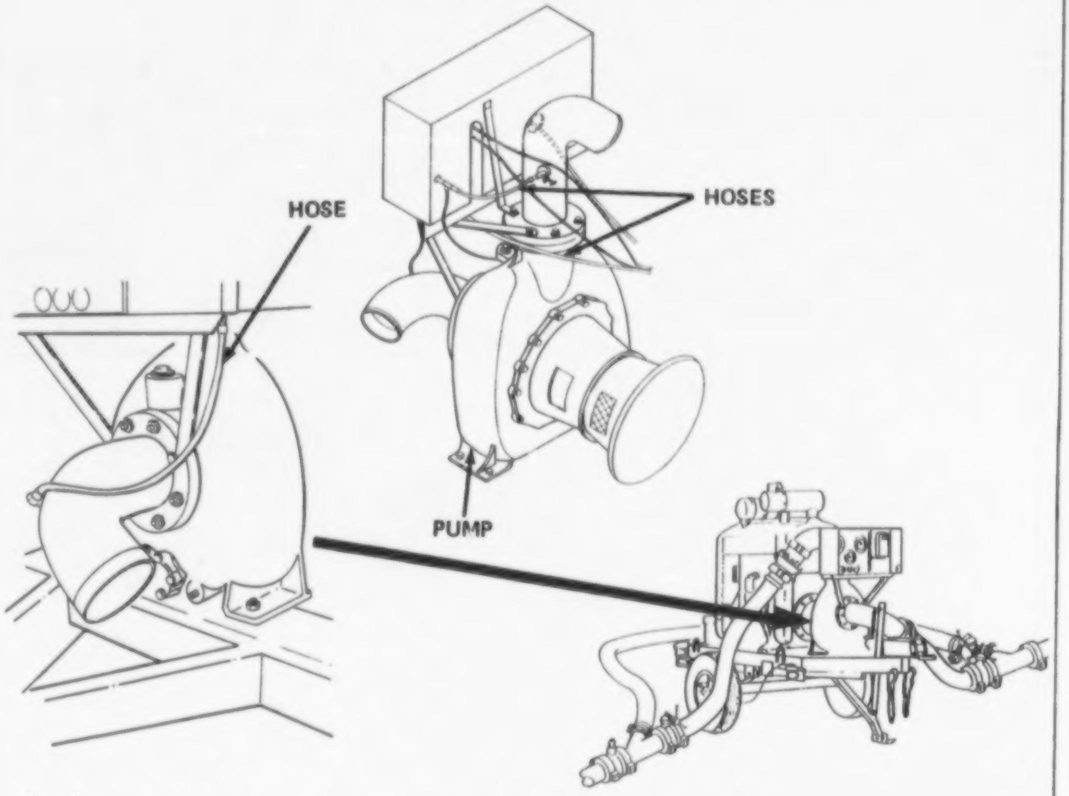
Item No.	Interval				Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
	B	D	A	W		
					TRAILER-MOUNTED PUMP ASSEMBLY (UNIT 609)  	
21	•	•			**Pump.** Check for damage and leaks. If pump is damaged or leaking, notify organizational maintenance. Check hoses and fittings for damage and leaks. If pump, hose, or fitting is damaged or leaking, notify organizational maintenance.	Pump is damaged or leaking. Hose or fitting is damaged or leaking.

Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation D - During Operation A - After Operation

W - Weekly

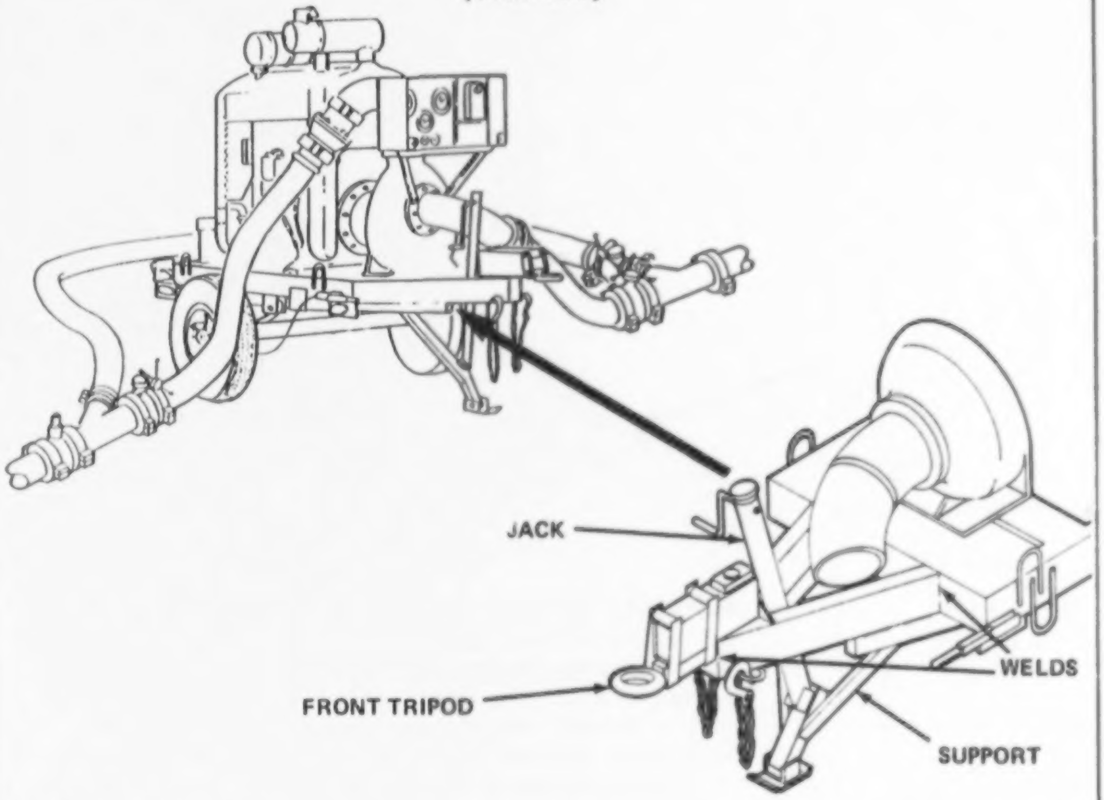
Item No.	Interval				Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
	B	D	A	W		
					TRAILER-MOUNTED PUMP ASSEMBLY (UNIT 609)  	
22	●				**Front Tripod.** Check supports and welds on tripod for damage. If damaged, notify organizational maintenance. Check to see if jack is damaged. Make sure jack is secured and operable. If jack is damaged, or not secured or operable, notify supervisor.	Tripod is damaged. Jack is damaged, or not secured or operable.

Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation D - During Operation A - After Operation

W - Weekly

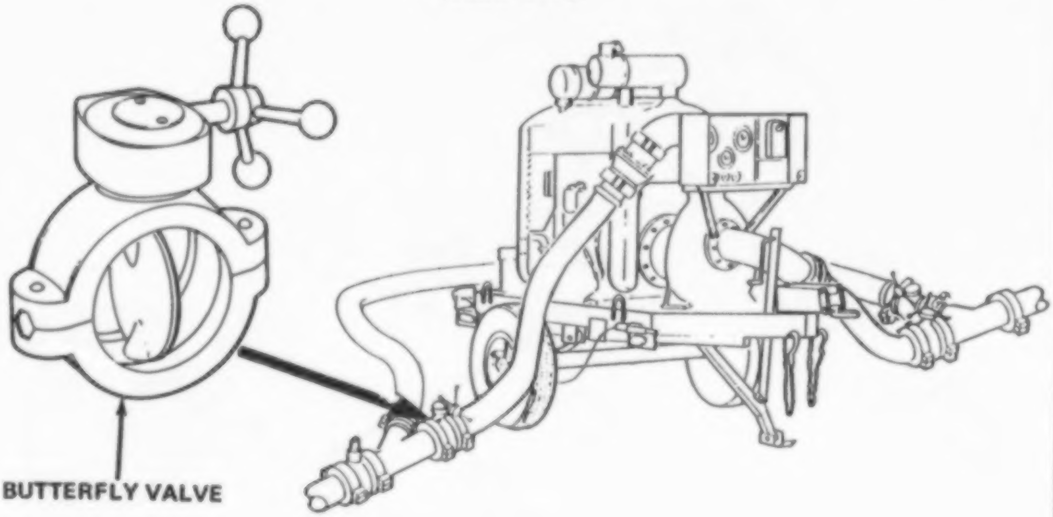
Item No.	Interval				Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
	B	D	A	W		
					TRAILER-MOUNTED PUMP ASSEMBLY (UNIT 609)  	
23	●				**Butterfly Valves.** Make sure butterfly valves on suction and discharge hoses are open. If valve will not open, stop pump. Notify supervisor. Make sure butterfly valve on bypass assembly is closed when not in use. If valve will not close, notify supervisor.	Valve is closed. Valve is opened.

Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation D - During Operation A - After Operation

W - Weekly

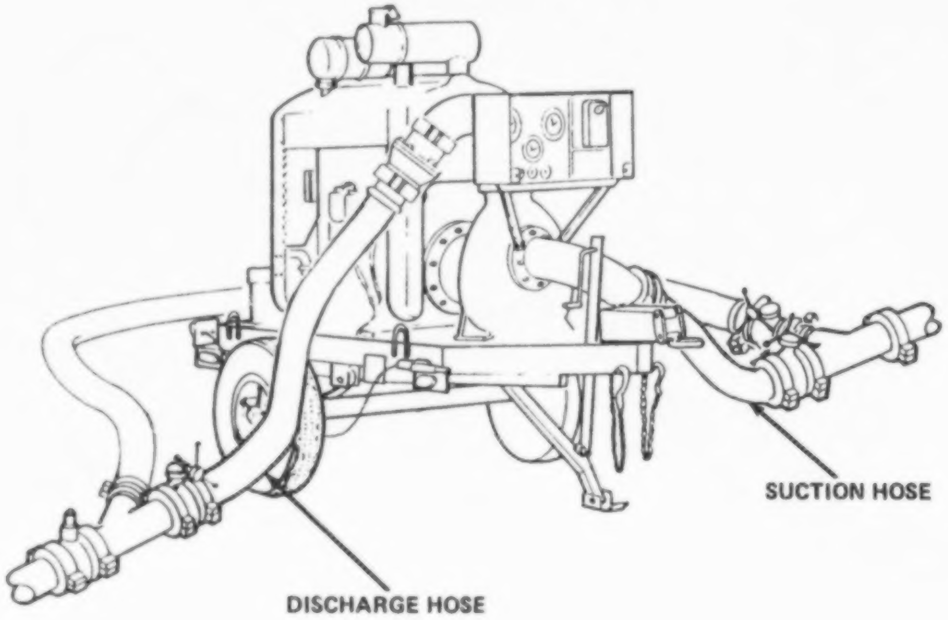
Item No.	Interval				Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
	B	D	A	W		
					TRAILER-MOUNTED PUMP ASSEMBLY (UNIT 609) 	
24	•	•			**Suction and Discharge Hoses.** Check for damage, leaks, and loose connections. Tighten loose connection. If hose is damaged or leaking, notify supervisor.	Hose is damaged, collapsed, or leaking. Connection is loose.

Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation D - During Operation A - After Operation

W - Weekly

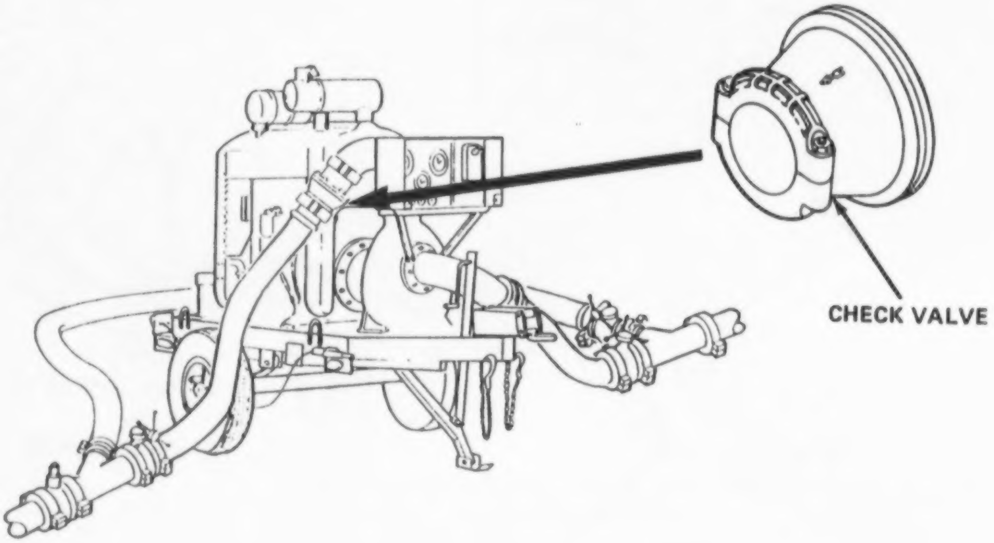
Item No.	Interval				Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
	B	D	A	W		
					TRAILER-MOUNTED PUMP ASSEMBLY (UNIT 609)  	
25	●				**Check Valve.** Make sure check valve is installed properly. Arrow on body casing must point in direction of water flow. If valve is not installed correctly, notify supervisor. Check for leakage and loose connections. Tighten loose connection. If valve is leaking, notify supervisor.	Valve is not installed properly. Connection is loose. Valve is leaking.

Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation D - During Operation A - After Operation

W - Weekly

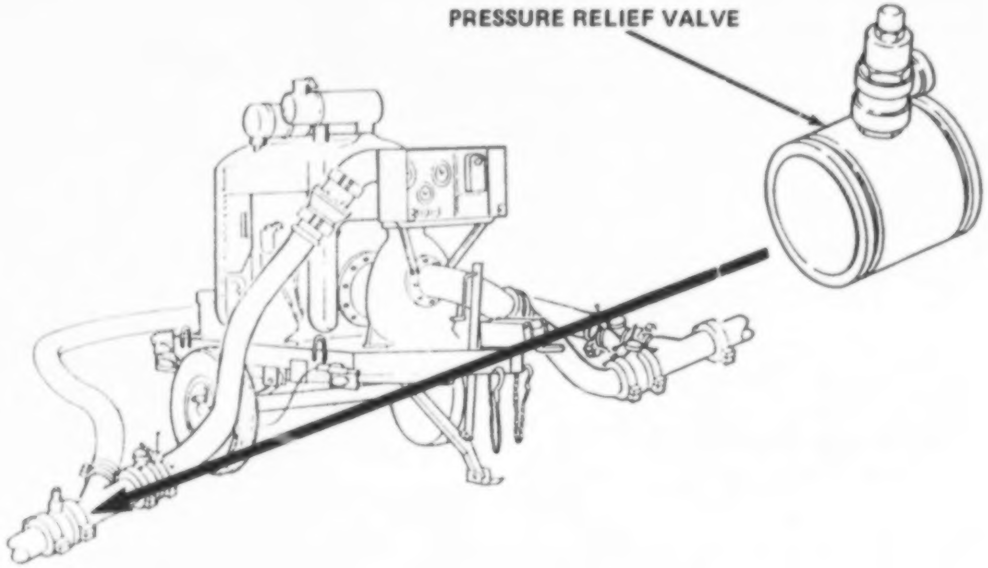
Item No.	Interval				Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
	B	D	A	W		
					TRAILER-MOUNTED PUMP ASSEMBLY (UNIT 609)  	
26	●	●			**Pressure Relief Valve.** Check valve for grit and sand. Using soft brush, clean if dirty. Check for damage and leaks. If damaged or leaking, notify supervisor.	Valve dirty. Valve damaged, leaking, or not working properly.

Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation D - During Operation A - After Operation

W - Weekly

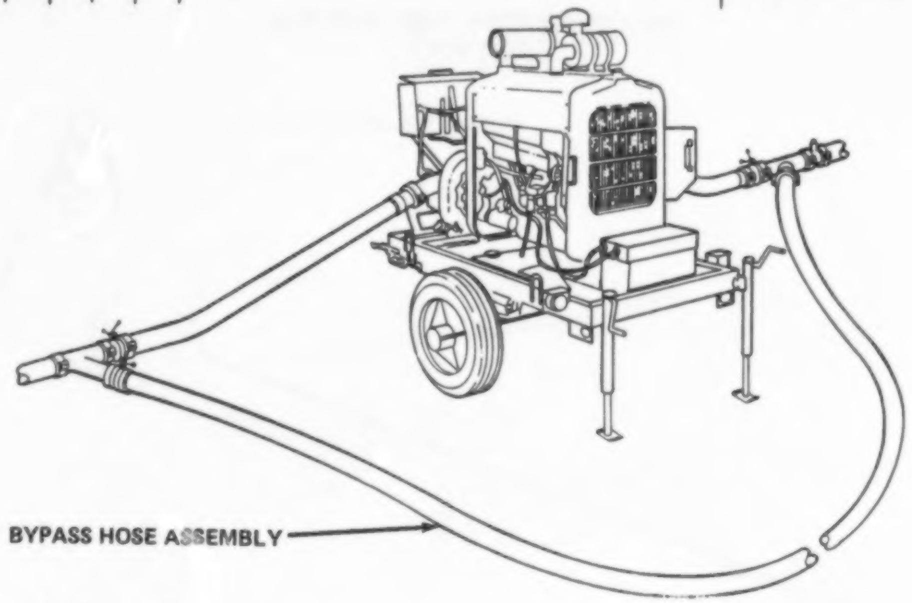
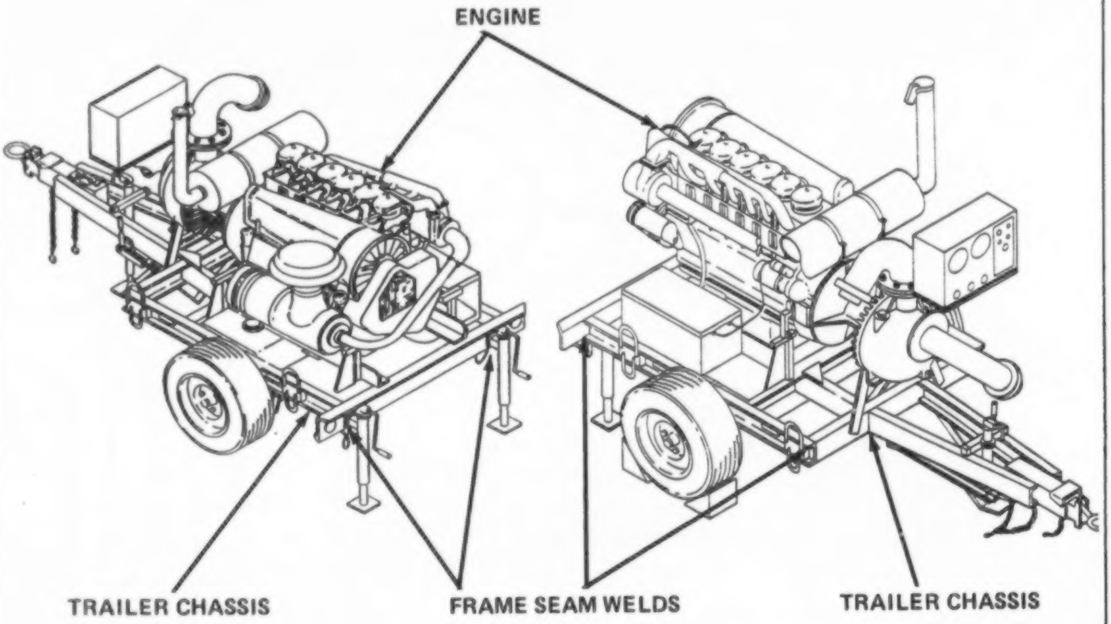
Item No.	Interval				Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
	B	D	A	W		
						
27	●	●			**Bypass Hose Assembly.** Check for loose connections, damage, and leaks. Tighten loose connections. If hose is damaged or leaking, notify supervisor.	Connection is loose. Hose assembly is damaged or leaking.

Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation D - During Operation A - After Operation

W - Weekly

Item No.	Interval B	Interval D	Interval A	Interval W	Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
					TRAILER-MOUNTED PUMP ASSEMBLY (US636HCCD-1)	
28	●	●	●		**Engine.** Inspect ground for evidence of leaks. If leaks are present, notify organizational maintenance.	Any evidence of leaks on ground.



Item No.	Interval B	Interval D	Interval A	Interval W	Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
29	●				**Trailer Chassis.** Inspect all frame seam welds for damage. If damaged, notify organizational maintenance. Check axle, lunette, and spring for damage. If axle or spring is damaged, notify organizational maintenance.	Welds are damaged. Axle, lunette, or spring is damaged.

Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation D - During Operation A - After Operation

W - Weekly

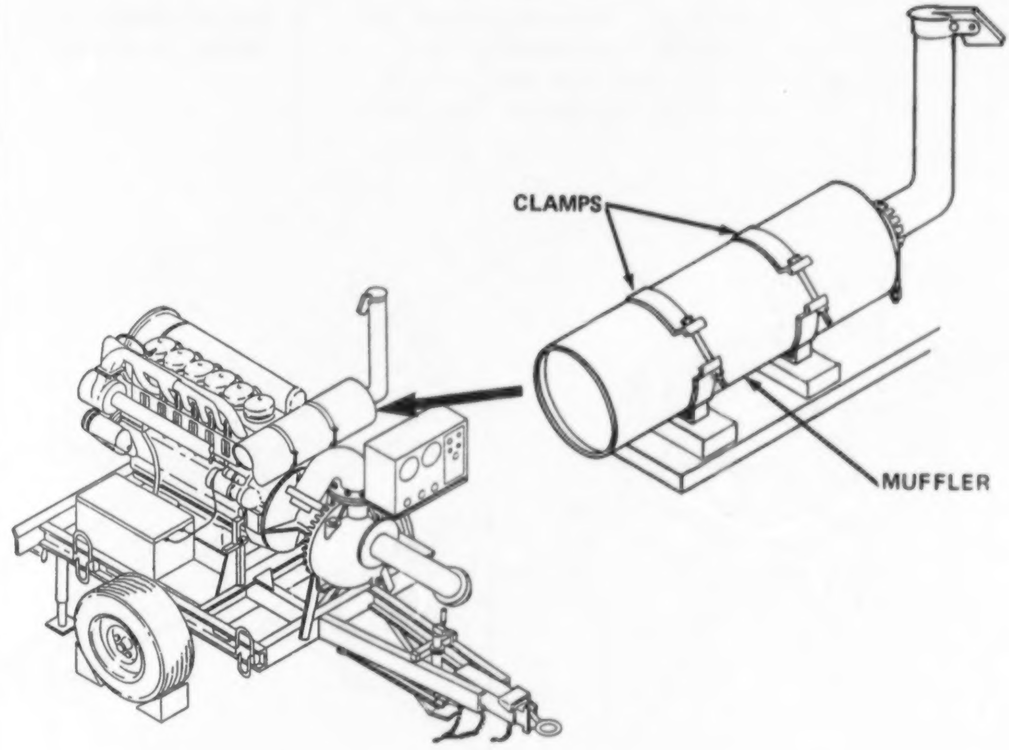
Item No.	Interval				Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
	B	D	A	W		
					TRAILER-MOUNTED PUMP ASSEMBLY (US636HCCD-1) 	
30	●	●			**Muffler.** Before operation, check for damage and loose clamps. Tighten loose clamps. If muffler is damaged, notify organizational maintenance. During operation, if muffler makes excessive noise, notify organizational maintenance.	Muffler is damaged or clamps are loose.

Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation D - During Operation A - After Operation

W - Weekly

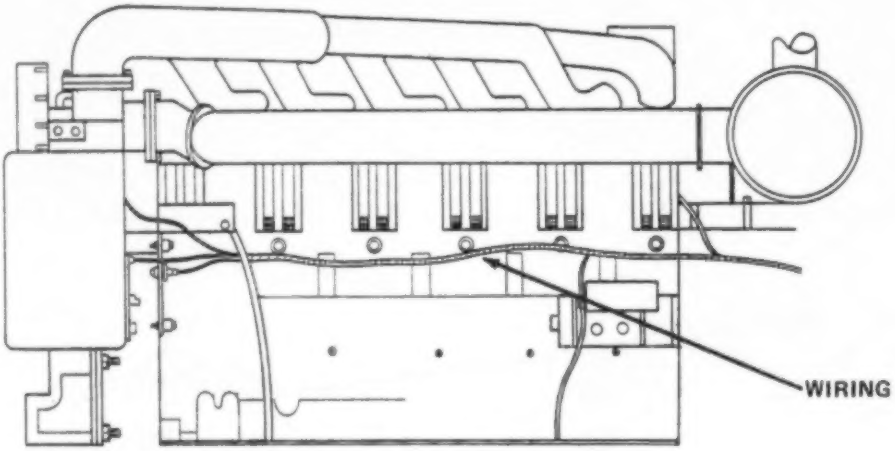
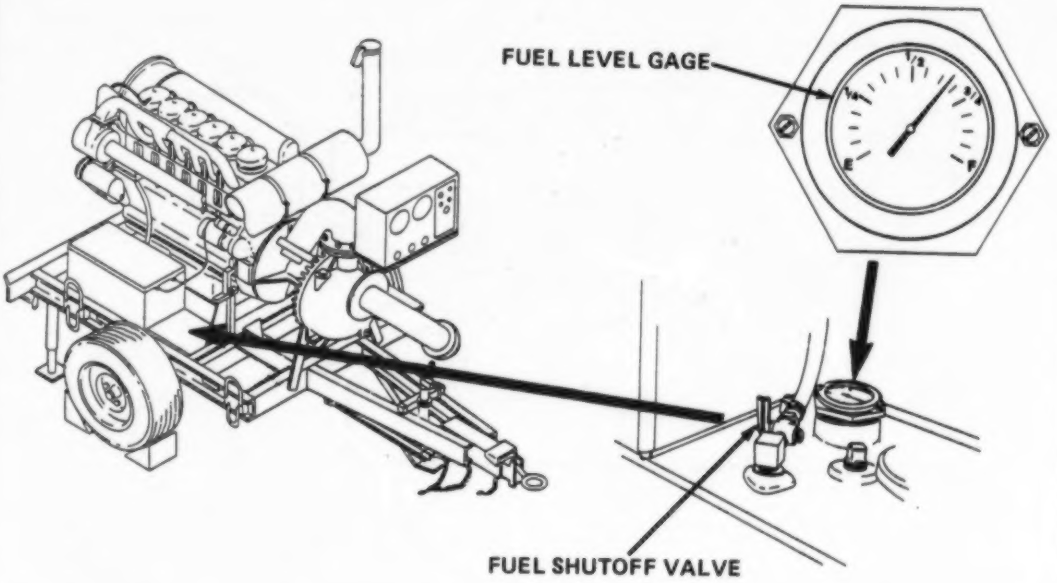
Item No.	Interval				Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
	B	D	A	W		
					TRAILER-MOUNTED PUMP ASSEMBLY (US636HCCD-1) 	
31	●				**Wiring.** Check for loose or damaged connections. If connection is loose or damaged, notify organizational maintenance.	Connection is damaged or loose.

Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation D - During Operation A - After Operation

W - Weekly

<table>
<tr><th rowspan="2">Item No.</th><th colspan="4">Interval</th><th rowspan="2">Item to Be Inspected
Procedure</th><th rowspan="2">Equipment Is Not Ready/Available If:</th></tr>
<tr><th>B</th><th>D</th><th>A</th><th>W</th></tr>
<tr><td colspan="7">TRAILER-MOUNTED PUMP ASSEMBLY
(US636HCCD-1)



WARNING

To prevent fire or explosion, keep open flame and sparks away from fuel tank.

CAUTION

To prevent condensation, fill tank after operation.</td></tr>
<tr><td>32</td><td>●</td><td>●</td><td>●</td><td></td><td>**Fuel Level.** Before and during operation, check fuel gage and add fuel (VV-F-800) as needed. After operation, fill fuel tank. Make sure fuel shutoff valve is operable. If valve is not operable, notify organizational maintenance.</td><td>Fuel level is low.
Fuel shutoff valve binds.</td></tr>
</table>

Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation D - During Operation A - After Operation

W - Weekly

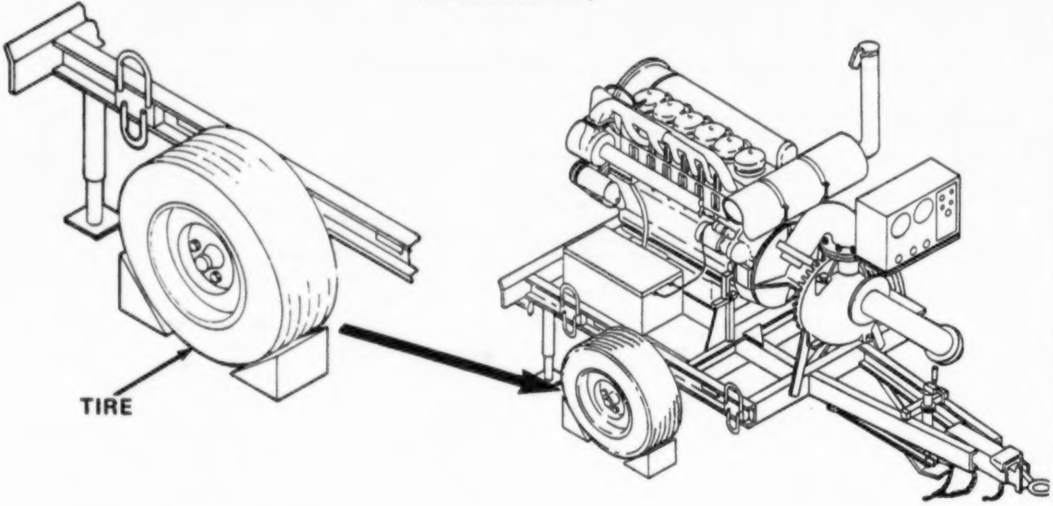
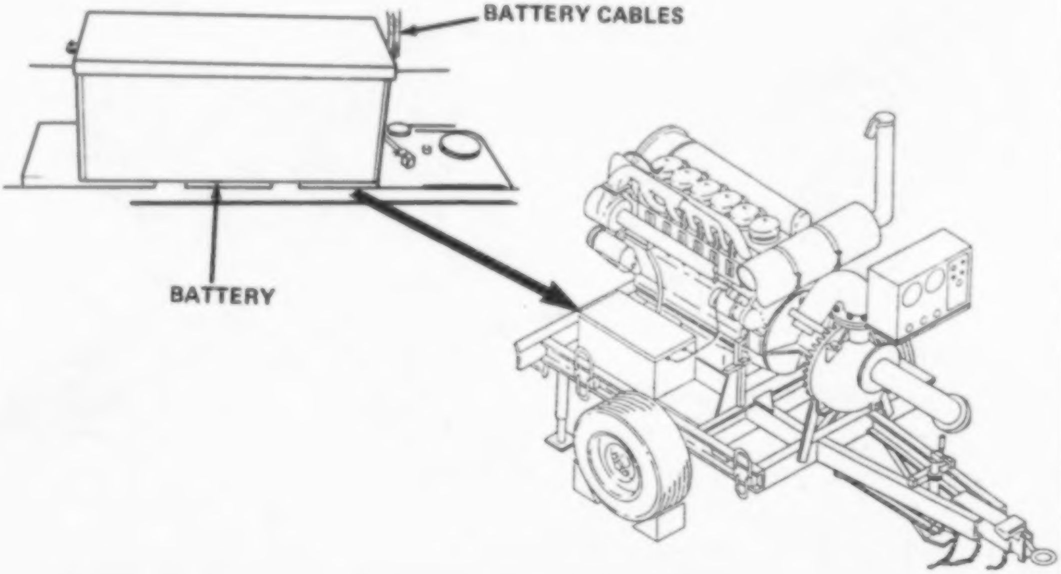
Item No.	Interval				Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
	B	D	A	W		
					TRAILER-MOUNTED PUMP ASSEMBLY (US636HCCD-1)  	
33				•	**Tires.** Check for damage to rim and tire. If tire or rim is damaged, notify organizational maintenance.	Tire or rim is damaged.

Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation   D - During Operation   A - After Operation

W - Weekly

TRAILER-MOUNTED PUMP ASSEMBLY
(US636HCCD-1)



WARNING

- DANGER OF EXPLOSION: Fumes from battery acid may cause explosion. To prevent explosion, keep sparks and open flame away from battery acid.
- CAUSTIC CHEMICALS: Use rubber gloves to avoid burns from battery acid. If acid gets on skin or into eyes, wash with water right away. Seek medical help.

Item No.	Interval				Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
	B	D	A	W		
34	●				**Battery.** Inspect cable connections. Check fluid level (para 3-5). Clean or service as necessary.	Cable connection is loose or corroded. Fluid level is low.

Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation D - During Operation A - After Operation

W - Weekly

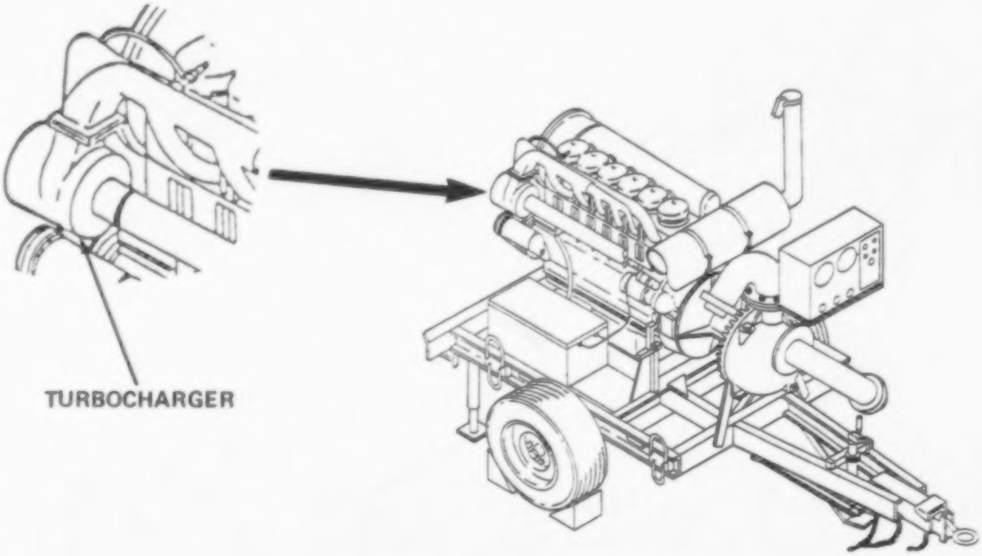
Item No.	Interval				Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
	B	D	A	W		
					TRAILER-MOUNTED PUMP ASSEMBLY (US636HCCD-1) 	
35	•	•			**Turbocharger.** Check for exhaust leaks and loose attaching hardware. Check for oil leakage. If exhaust or oil leakage is present, attaching hardware is loose, or turbocharger is damaged, notify organizational maintenance.	Turbocharger is leaking oil or exhaust fumes. Attaching hardware is loose. Turbocharger is damaged.

Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation D - During Operation A - After Operation

W - Weekly

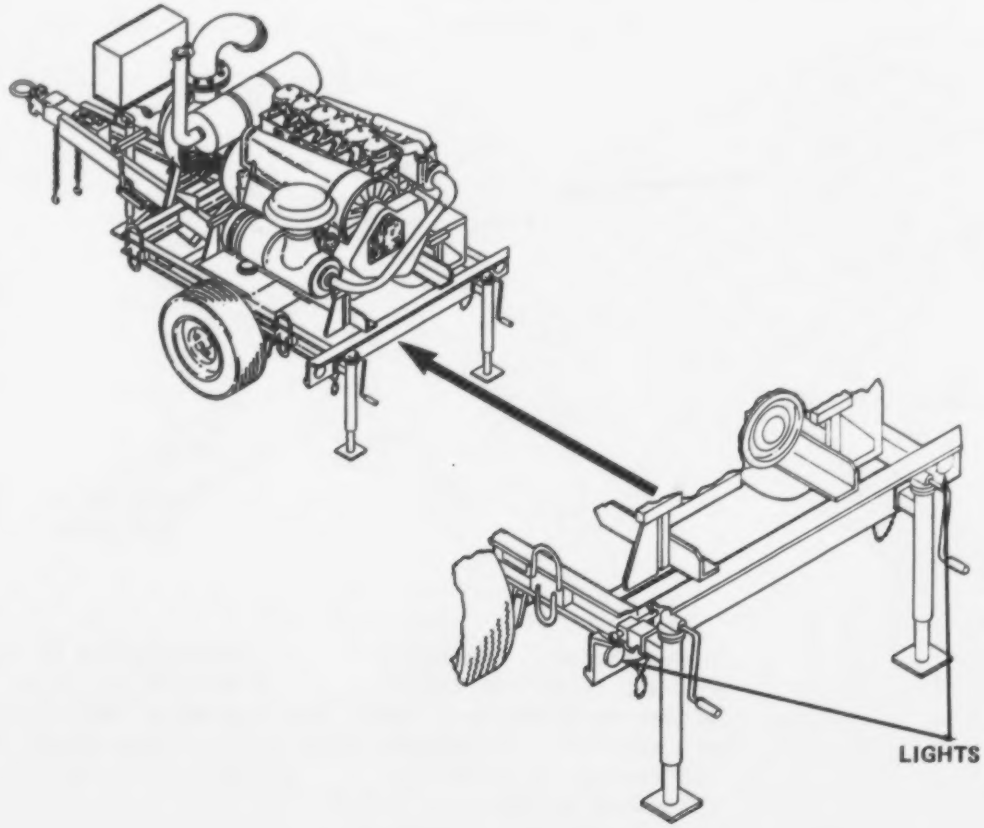
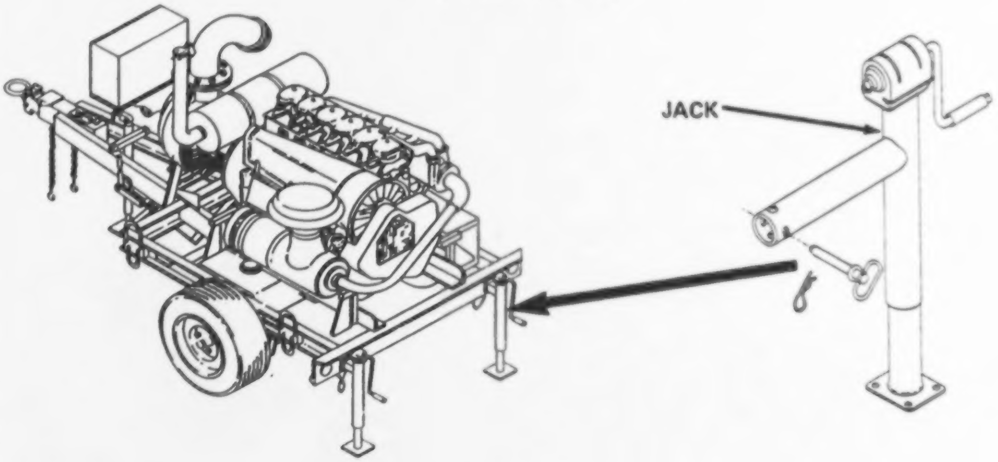
Item No.	Interval				Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
	B	D	A	W		
					TRAILER-MOUNTED PUMP ASSEMBLY (US636HCCD-1)  	
36				●	**Lights.** Check for cracked or broken lenses. If lens is cracked or broken, notify organizational maintenance.	

Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation D - During Operation A - After Operation

W - Weekly

TRAILER-MOUNTED PUMP ASSEMBLY
(US636HCCD-1)



Item No.	Interval				Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
	B	D	A	W		
37	●				**Jacks.** Check to see if jack is damaged. Make sure jack is secured and operable. If jack is damaged, or not secured or operable, notify supervisor.	Jack is damaged not secure or operable.

Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation D - During Operation A - After Operation

W - Weekly

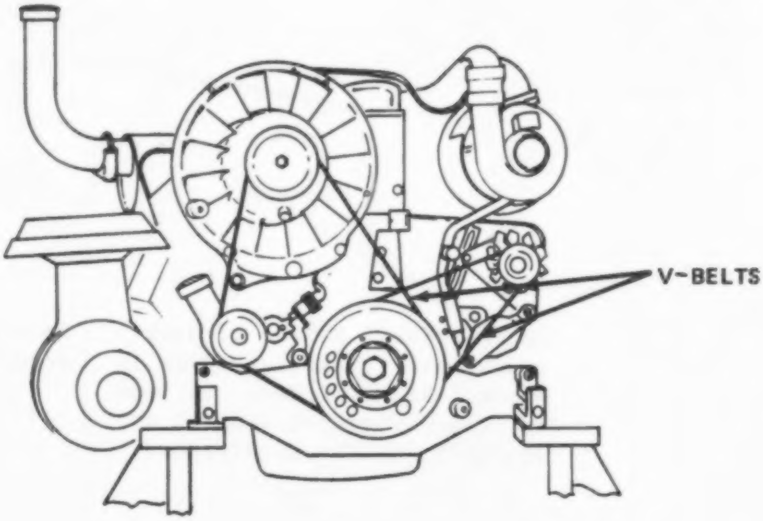
Item No.	Interval				Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
	B	D	A	W		
					TRAILER-MOUNTED PUMP ASSEMBLY (US636HCCD-1)  	
38	•				**V-Belts.** Remove V-belt guard and inspect belts for wear, damage, and proper adjustment (para 3-9). If belt is worn, damaged, or not properly adjusted, notify organizational maintenance.	Belt is worn, damaged, or not properly adjusted.

Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation D - During Operation A - After Operation

W - Weekly

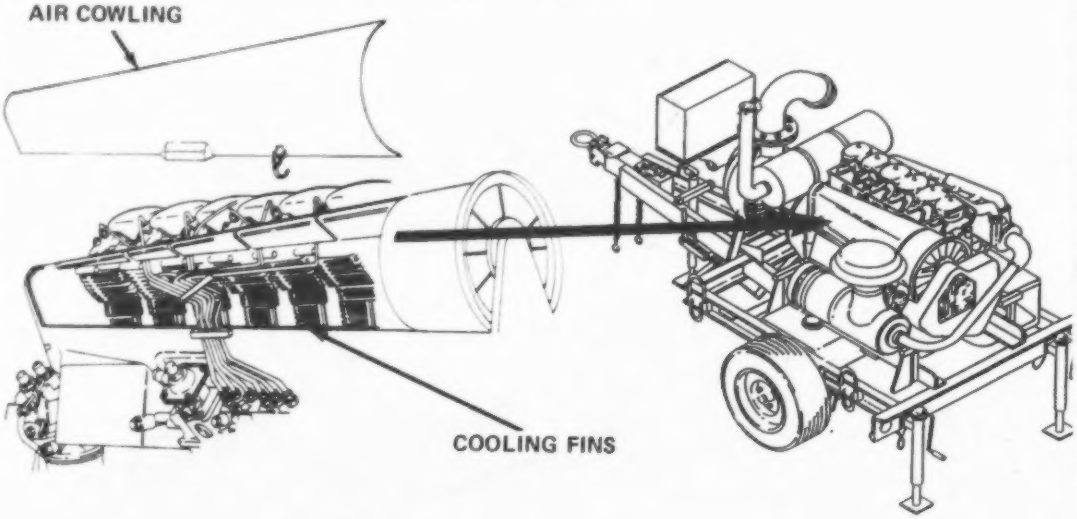
Item No.	Interval				Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
	B	D	A	W		
					TRAILER-MOUNTED PUMP ASSEMBLY (US636HCCD-1)  	
39	•		•		**Cooling Fins.** Remove air cowling and inspect fins. Check for damaged fins. If fin is damaged, notify organizational maintenance. Check for dirty or clogged air passages. Clean as necessary (para 3-10).	Fins are damaged. Air passages are dirty or clogged.

Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation   D - During Operation   A - After Operation

W - Weekly

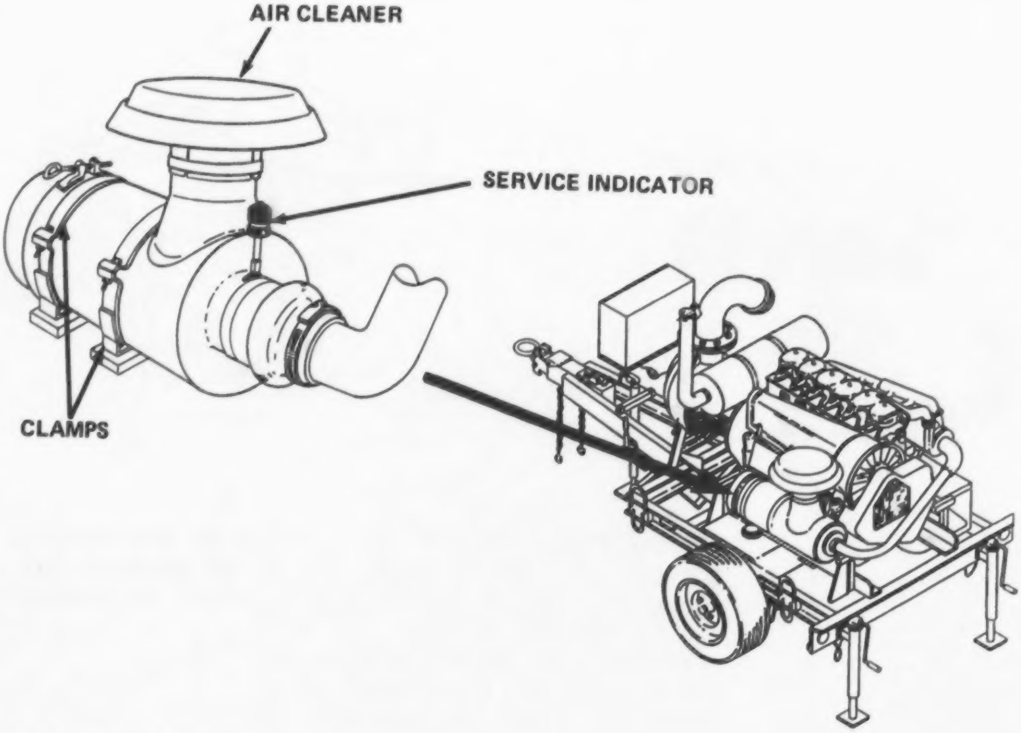
Item No.	Interval				Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
	B	D	A	W		
					TRAILER-MOUNTED PUMP ASSEMBLY (US636HCCD-1) 	
40	•	•	•		**Air Cleaner.** Before operation, service filter assembly (para 3-6). If service indicator is red, clean filter assembly. Check for and tighten loose clamps. Check for damage. If damage is present, notify organizational maintenance.	Service indicator is red. Damage is present.

Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation D - During Operation A - After Operation

W - Weekly

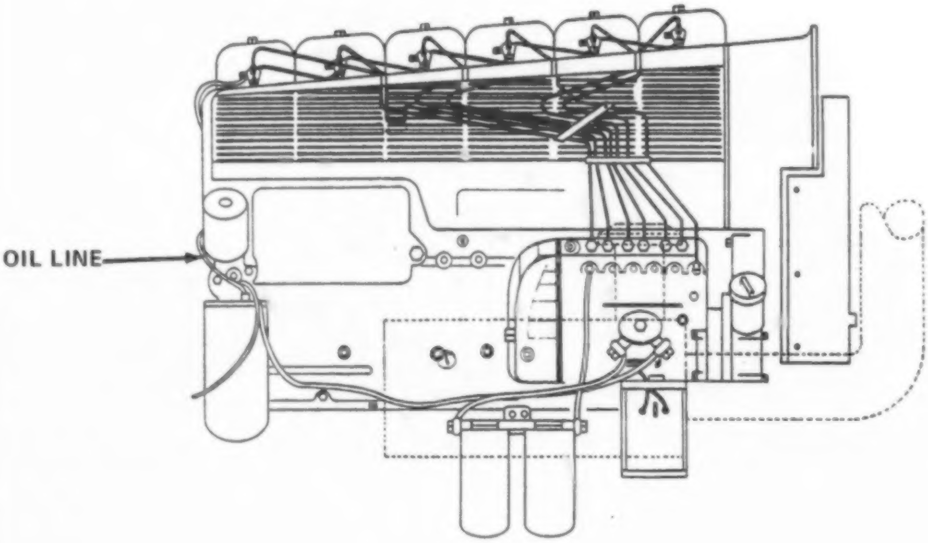
Item No.	Interval				Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
	B	D	A	W		
					TRAILER-MOUNTED PUMP ASSEMBLY (US636HCCD-1)  	
41	●	●	●		**Oil Lines.** Inspect lines for damage and leaks. If line is damaged or leaking, notify organizational maintenance.	Oil line is damaged or leaking.

Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation D - During Operation A - After Operation

W - Weekly

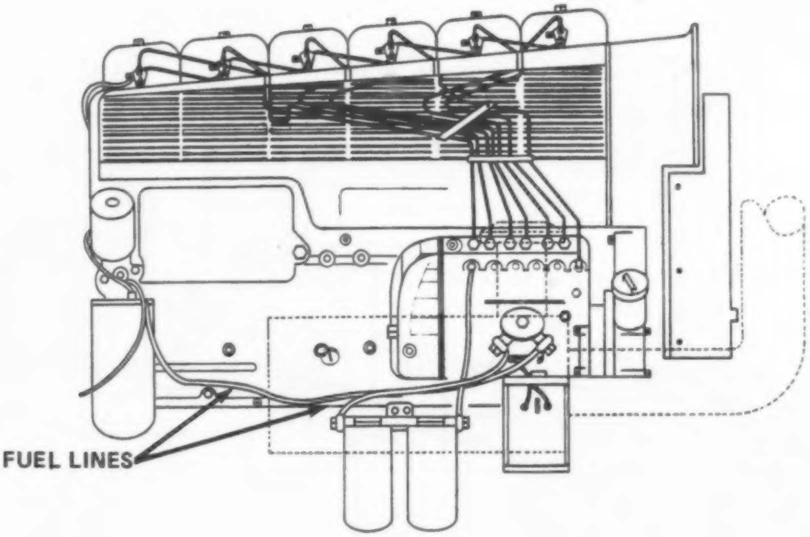
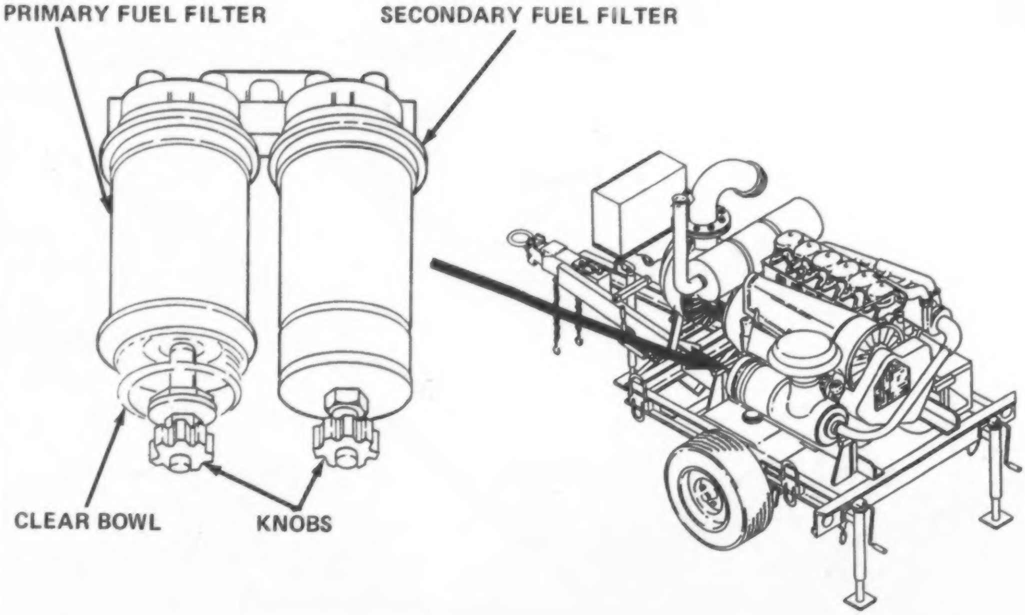
Item No.	Interval				Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
	B	D	A	W		
					TRAILER-MOUNTED PUMP ASSEMBLY (US636HCCD-1)  	
42	●	●	●		**Fuel Lines.** Inspect lines for damage and leaks. If line is damaged or leaking, notify organizational maintenance.	Fuel line is damaged or leaking.

Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation D - During Operation A - After Operation

W - Weekly

TRAILER-MOUNTED PUMP ASSEMBLY
(US636HCCD-1)



WARNING

To prevent fire or explosion, keep open flame and sparks away from fuel filter.

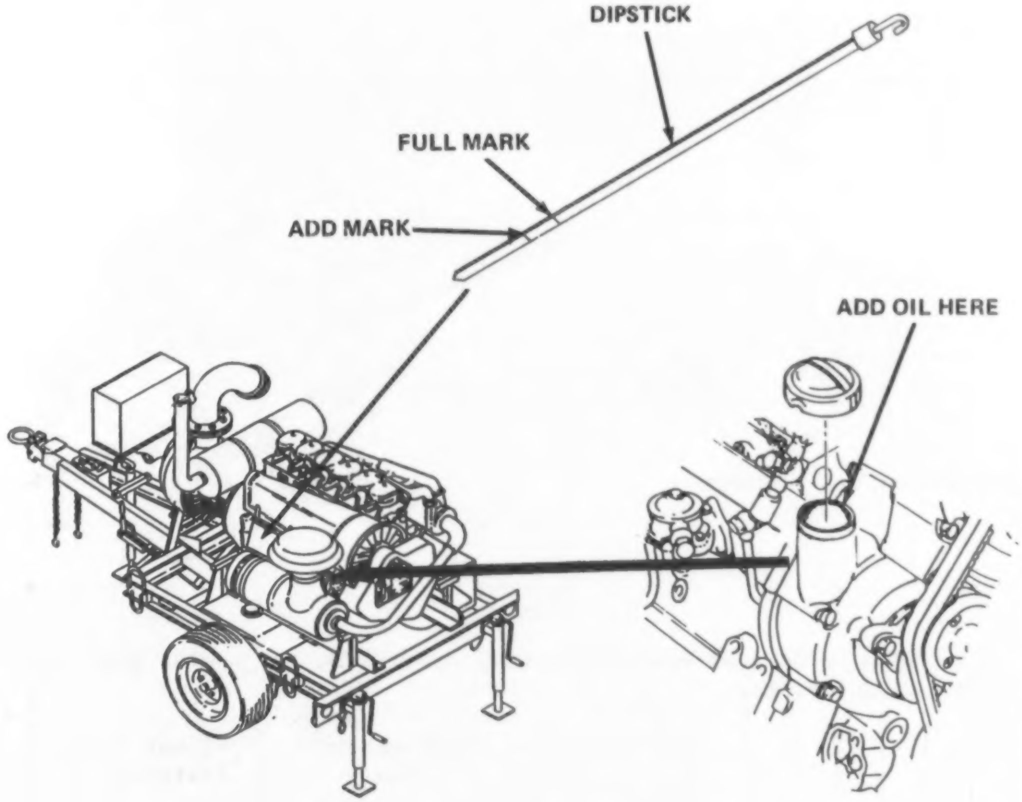
Item No.	Interval B	Interval D	Interval A	Interval W	Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
43	•				**Fuel Filters.** Check clear bowl on bottom of primary filter. If water is present in bowl, rotate knob on bottom and drain water. Close knob when water drains and fuel starts coming through valve. Open knob on bottom of secondary filter. Drain water and sediment. Close valve when fuel starts coming through outlet.	Filter needs draining.

Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation D - During Operation A - After Operation

W - Weekly

TRAILER-MOUNTED PUMP ASSEMBLY
(US636HCCD-1)



CAUTION

To avoid damaging engine, DO NOT overfill crankcase with oil. Oil level should never be above FULL mark on dipstick.

Item No.	Interval				Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
	B	D	A	W		
44	•		•		**Oil Level.** Check level. Add oil (MIL-L-2104) as necessary to full mark on dipstick.	Oil level is below add line on dipstick.

Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation D - During Operation A - After Operation

W - Weekly

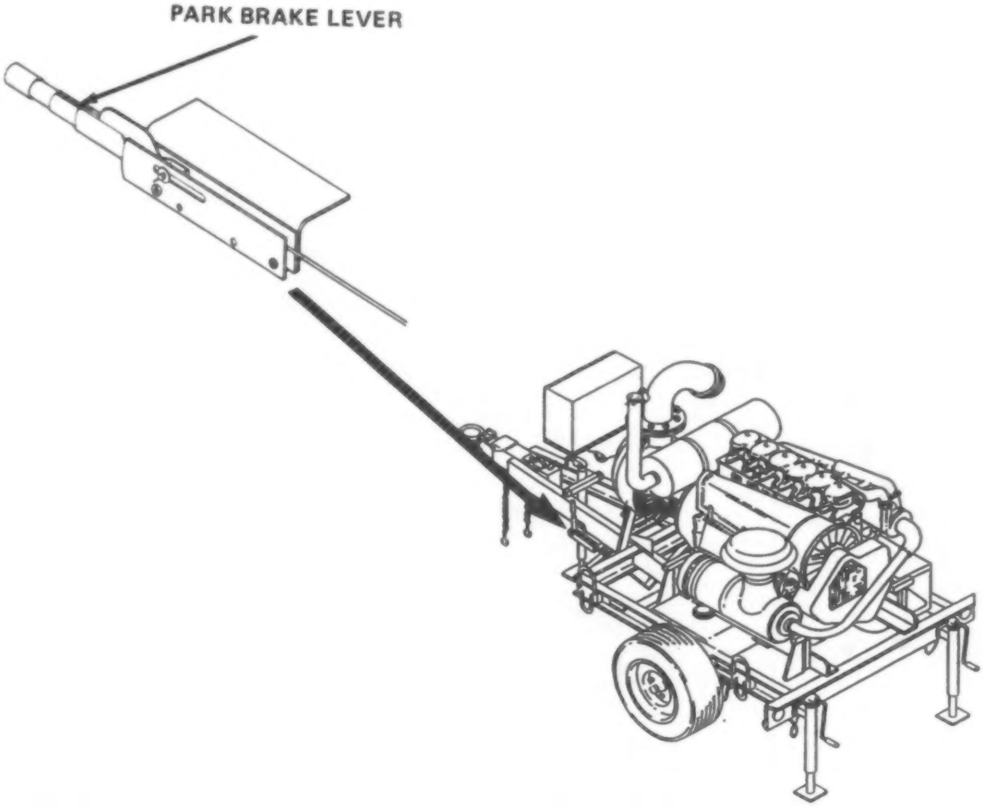
Item No.	Interval				Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
	B	D	A	W		
					TRAILER-MOUNTED PUMP ASSEMBLY (US636HCCD-1) 	
45	●				**Park Brake.** Check that lever is locked. Check for proper adjustment. Adjust cable as needed (para 3-8).	Park brake is not locked or properly adjusted.

Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation D - During Operation A - After Operation

W - Weekly

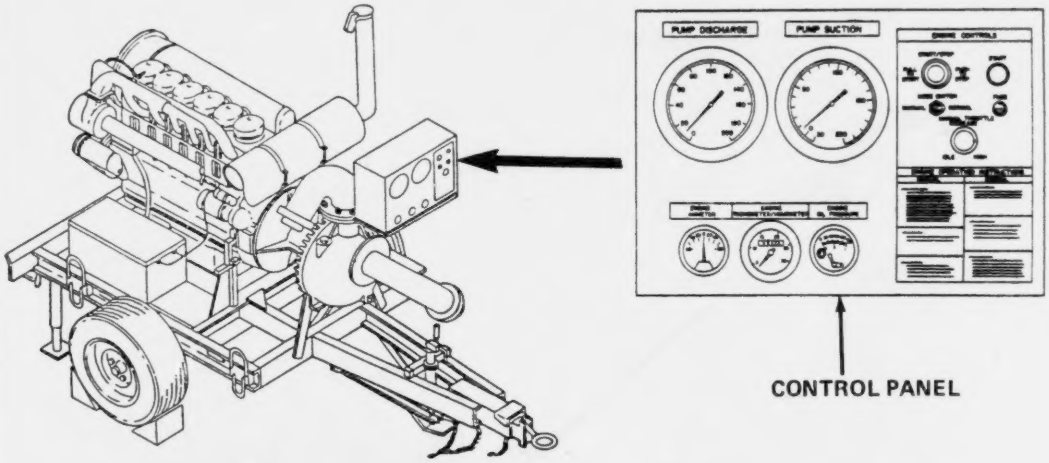
Item No.	Interval				Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
	B	D	A	W		
					TRAILER-MOUNTED PUMP ASSEMBLY (US636HCCD-1)  PUMP DISCHARGE PUMP SUCTION ENGINE CONTROLS CONTROL PANEL	
46	•				**Control Panel.** Check gage faces for cracked or broken glass. Check controls for free movement. Check control panel box and cover for damage. Check for damaged hinge or fastener. If gage face is cracked or broken, control binds, or box, cover, or hinge/fastener is damaged, notify organizational maintenance.	Control is binding, or gage face is cracked or broken.

Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation D - During Operation A - After Operation

W - Weekly

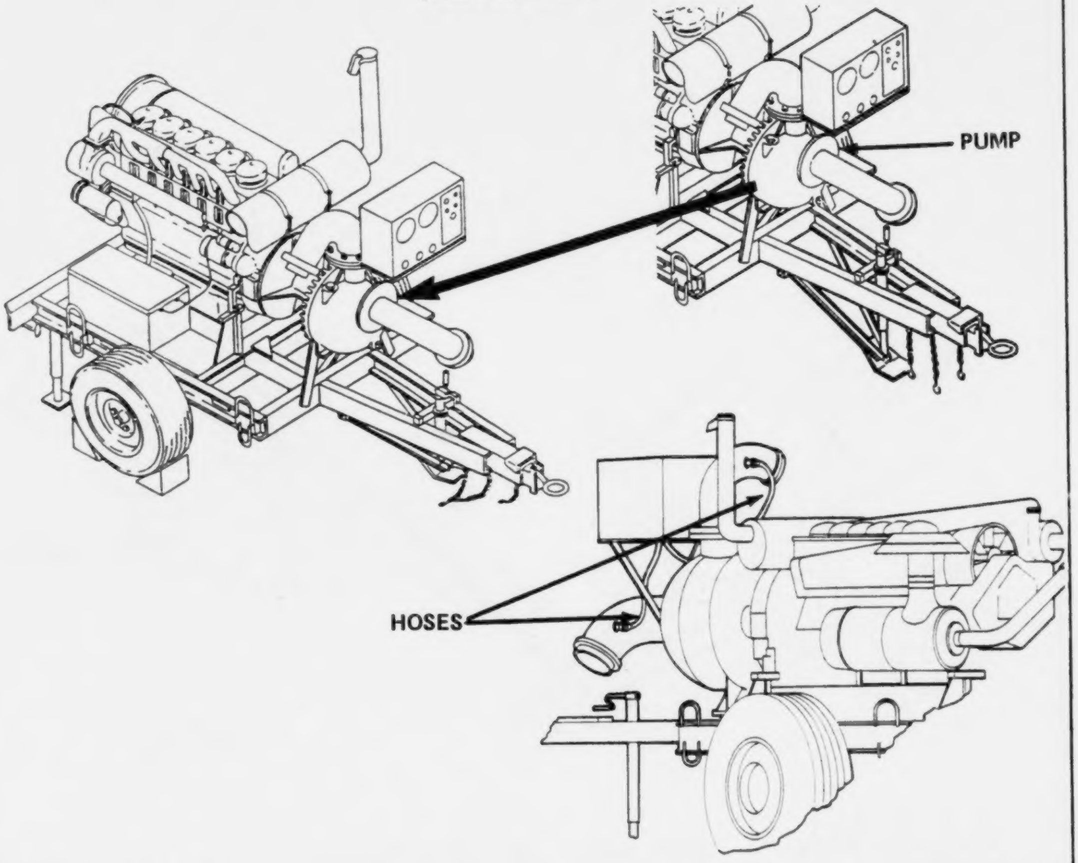
Item No.	Interval				Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
	B	D	A	W		
					TRAILER-MOUNTED PUMP ASSEMBLY (US636HCCD-1) 	
47	●	●			**Pump.** Check for damage and leaks. If pump is damaged or leaking, notify organizational maintenance. Check hoses and fittings for damage and leaks. If pump, hose, or fitting is damaged or leaking, notify organizational maintenance.	Pump is damaged or leaking. Hose or fitting is damaged or leaking.

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Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation D - During Operation A - After Operation

W - Weekly

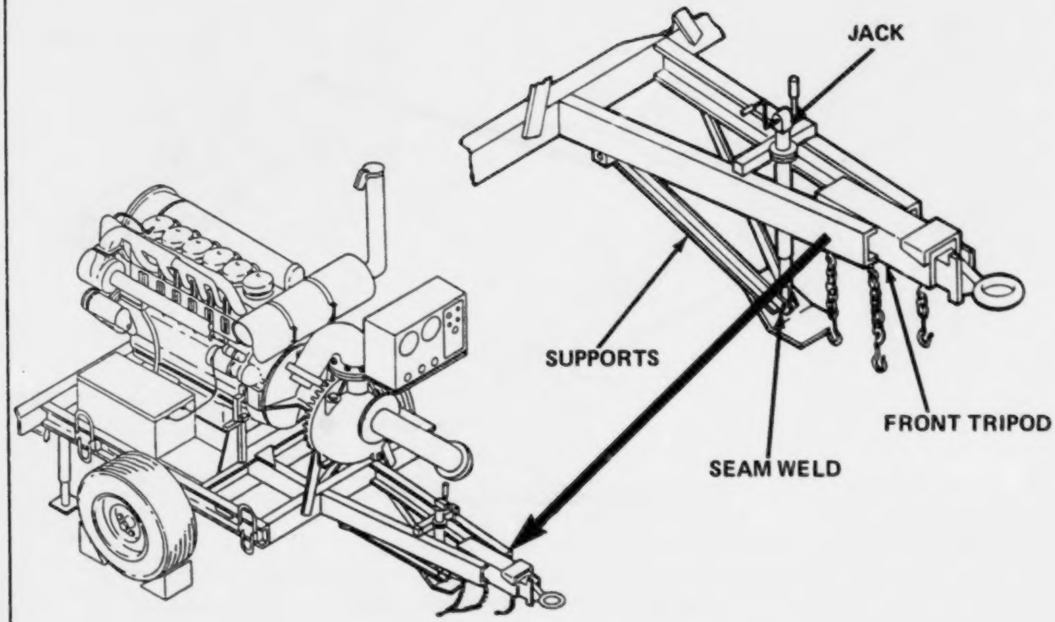
Item	Interval				Item to Be Inspected	Equipment Is Not
No.	B	D	A	W	Procedure	Ready/Available If:
					TRAILER-MOUNTED PUMP ASSEMBLY (US636HCCD-1)  	
48	•				**Front Tripod.** Check supports and weld on tripod for damage. If damaged, notify organizational maintenance. Check to see if jack is damaged. Make sure jack is secured and operable. If jack is damaged, or not secured or operable, notify supervisor.	Tripod is damaged. Jack is damaged, or not secured or operable.

Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation D - During Operation A - After Operation

W - Weekly

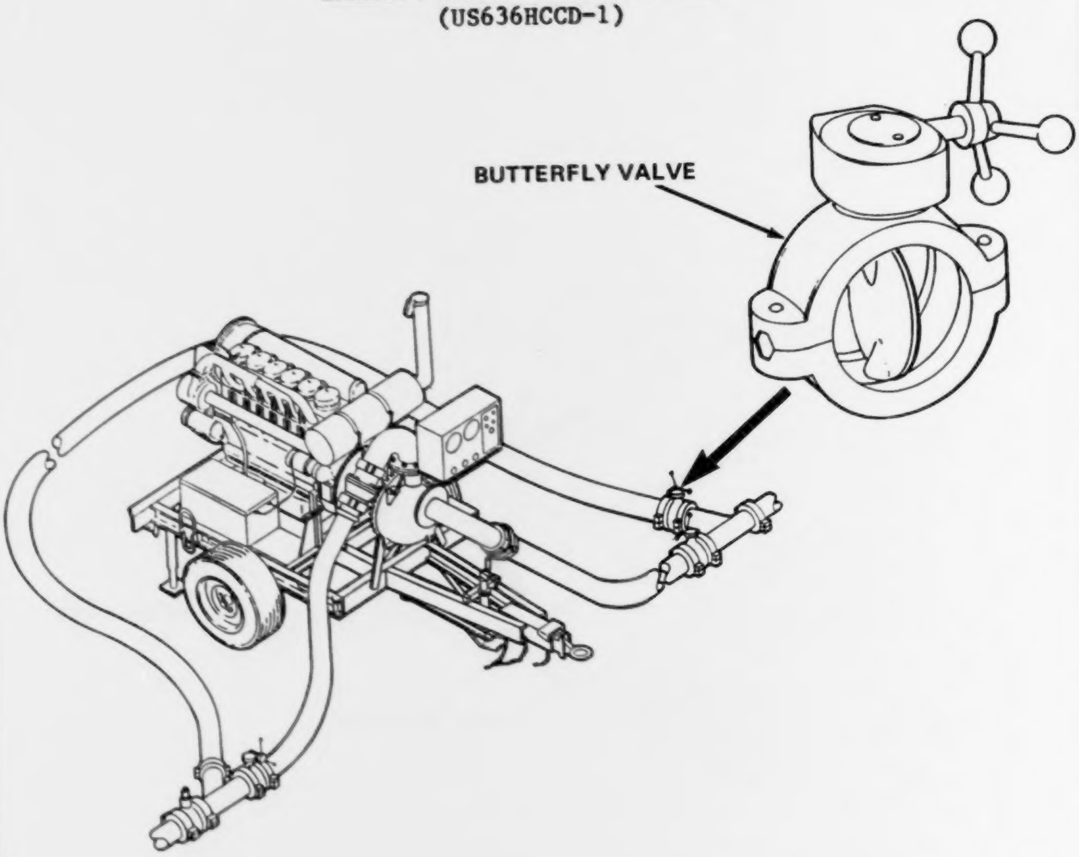
Item No.	Interval				Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
	B	D	A	W		
					TRAILER-MOUNTED PUMP ASSEMBLY (US636HCCD-1)  	
49	•				**Butterfly Valves.** Make sure butterfly valves on suction and discharge hoses are open. If valve will not open, stop pump. Notify supervisor. Make sure butterfly valve on bypass assembly is closed when not in use. If valve will not close, notify supervisor.	Valve is closed. Valve is closed.

Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation D - During Operation A - After Operation

W - Weekly

Item No.	Interval B	Interval D	Interval A	Interval W	Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
					TRAILER-MOUNTED PUMP ASSEMBLY (US636HCCD-1)	
50	●	●			**Suction and Discharge Hoses.** Check for damage, leaks, and loose connections. Tighten loose connection. If hose is damaged or leaking, notify supervisor.	Hose is damaged, collapsed, or leaking. Connection is loose.

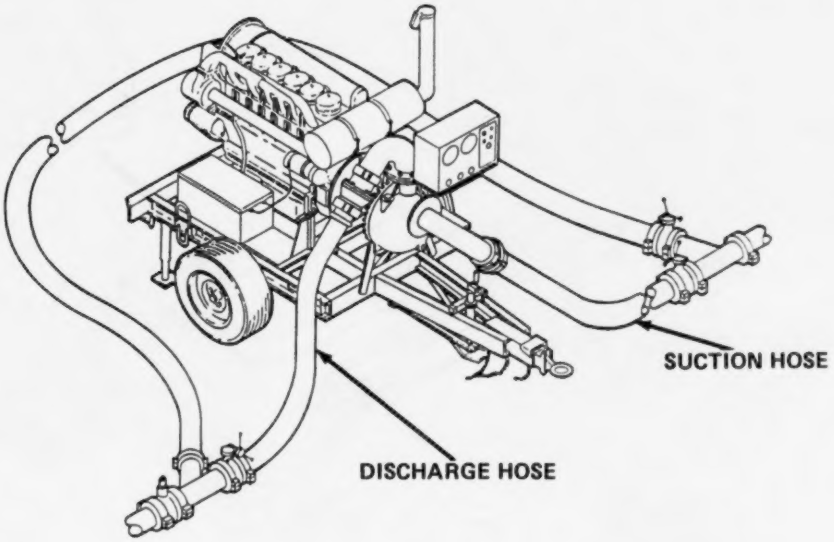


Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation D - During Operation A - After Operation

W - Weekly

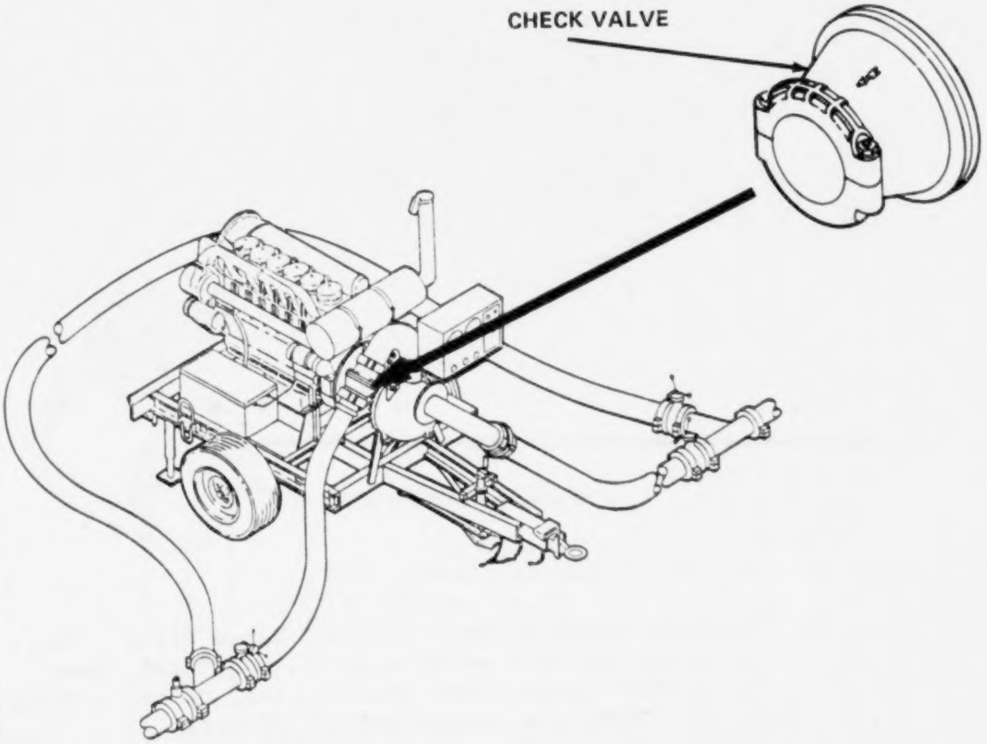
Item No.	Interval				Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
	B	D	A	W		
					TRAILER-MOUNTED PUMP ASSEMBLY (US636HCCD-1)  	
51	●				**Check Valve.** Make sure valve is installed properly. Arrow on body casing must point in direction of water flow. If valve is not installed correctly, notify supervisor. Check for leakage and loose connections. Tighten loose connection. If valve is leaking, notify supervisor.	Valve is not installed properly. Connection is loose. Valve is leaking.

Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation D - During Operation A - After Operation

W -Weekly

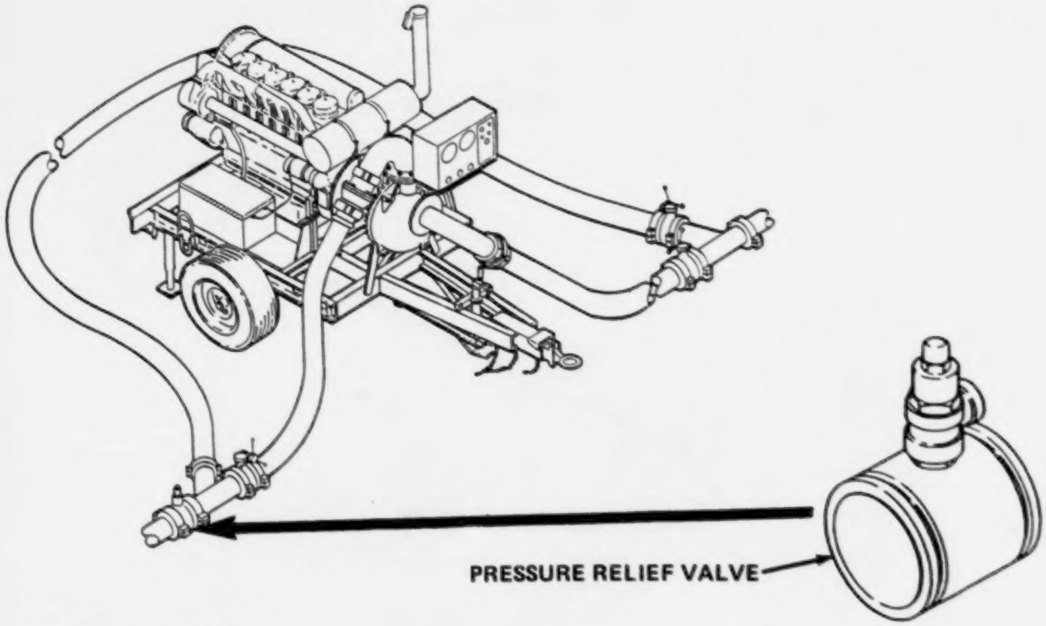
Item No.	Interval				Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
	B	D	A	W		
					TRAILER-MOUNTED PUMP ASSEMBLY (US636HCCD-1)  	
52	●	●			**Pressure Relief Valve.** Check valve for grit and sand. Using soft brush, clean if dirty. Check for damage and leaks. If damaged or leaking, notify supervisor.	Valve dirty. Valve is damaged, leaking, or not working properly.

Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation D - During Operation A - After Operation

W - Weekly

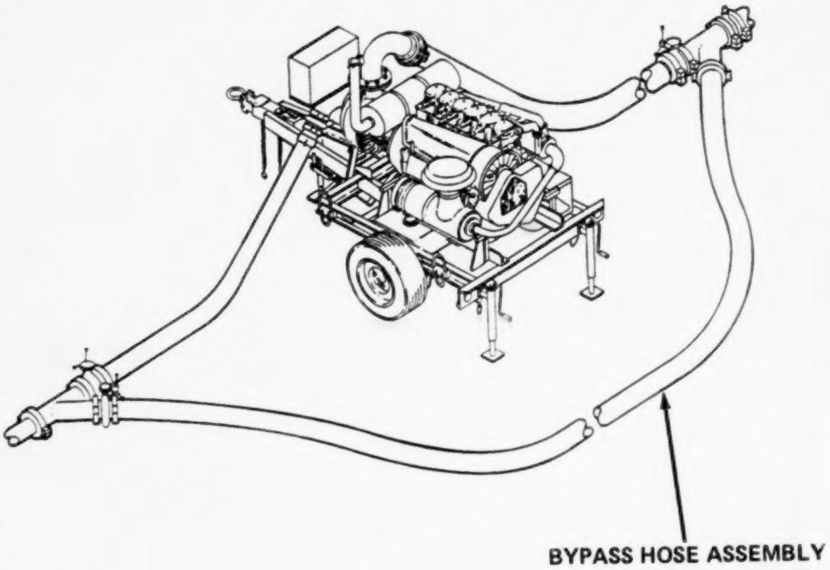
Item No.	Interval				Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
	B	D	A	W		
					TRAILER-MOUNTED PUMP ASSEMBLY (US636HCCD-1)  	
53	•	•			**Bypass Hose Assembly.** Check for damage, leaks, and loose connections. Tighten loose connections. If hose is damaged or leaking, notify supervisor.	Connection is loose. Hose assembly is damaged or leaking.

Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation D - During Operation A - After Operation

W - Weekly

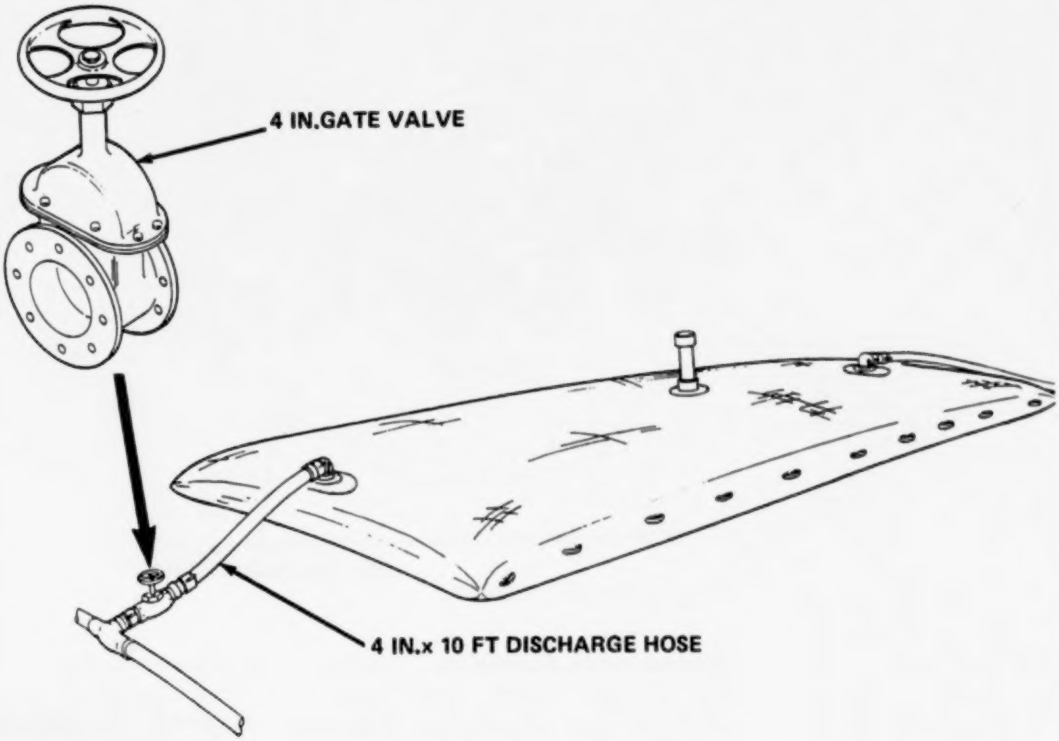
Item No.	Interval				Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
	B	D	A	W		
					STORAGE ASSEMBLY  	
54	●	●			**Gate Valve.** Check for damage and improper operation. If valve is damaged or not working properly, notify organizational maintenance.	Valve is damaged or not working properly.
55	●	●			**Hoses.** Check for damage, leaks, and loose connections. Tighten loose connections. If hose is damaged or leaking, notify supervisor.	Connection is loose. Hose is damaged or leaking.

Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation D - During Operation A - After Operation

W - Weekly

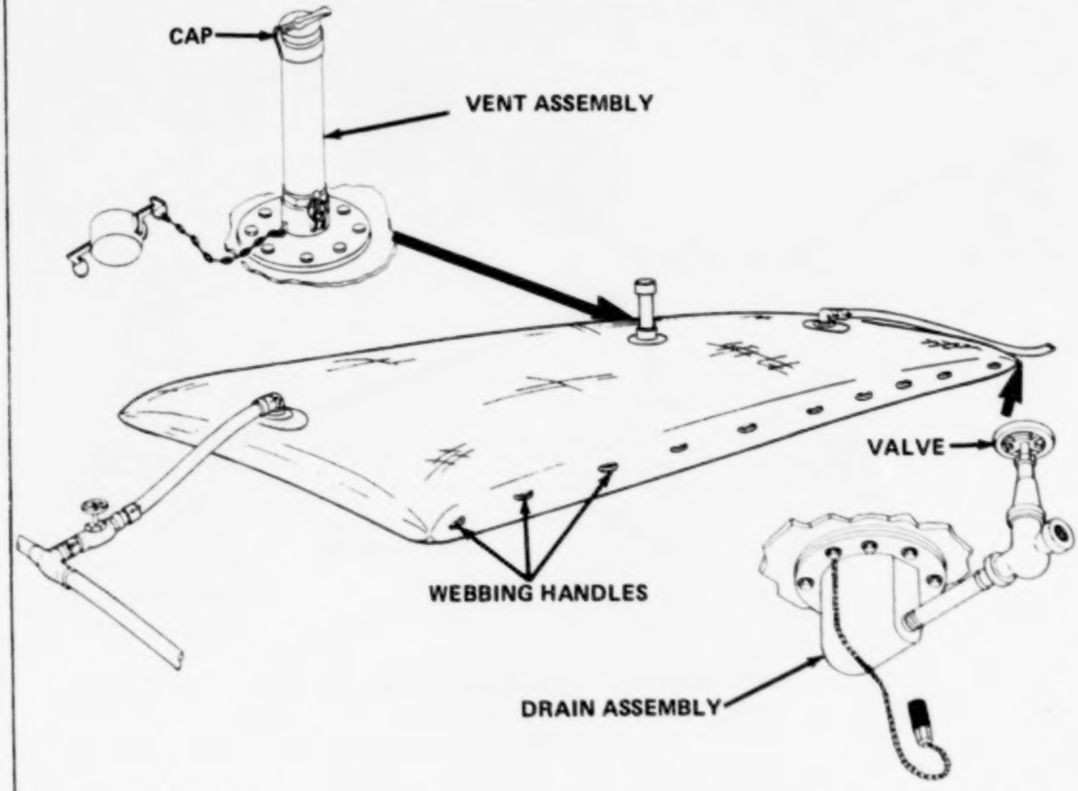
Item No.	Interval				Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
	B	D	A	W		
					STORAGE ASSEMBLY  CAP VENT ASSEMBLY VALVE WEBBING HANDLES DRAIN ASSEMBLY	
56	●	●			**Tank.** Rinse tank surfaces and accessories. Ensure valve on drain assembly is closed. Check cap on vent assembly for smooth operation. Check for broken webbing handles, exposed fabric, tears, punctures, and leaks. If tank or cap on vent assembly is damaged, notify supervisor.	Drain assembly valve is open. Vent assembly cap is damaged. Tank is damaged.

Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation D - During Operation A - After Operation

W - Weekly

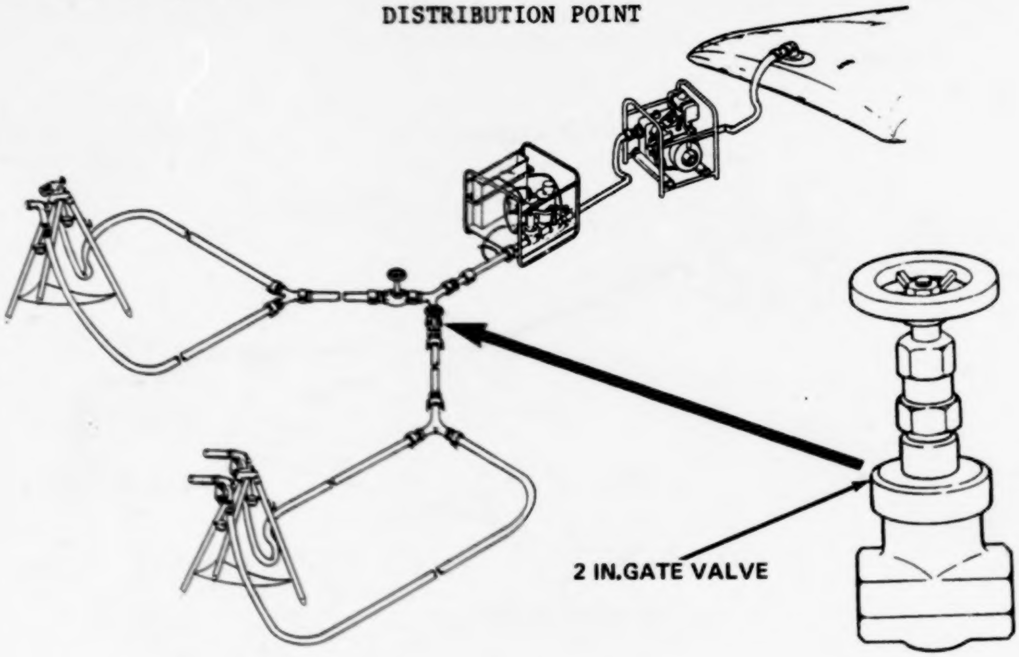
Item No.	Interval B	D	A	W	Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
					DISTRIBUTION POINT  	
57	●	●			**Gate Valves.** Check for leaks, damage, and improper operation. If valve is leaking, damaged, or not working properly, notify supervisor.	Valve is damaged, leaking, or not working properly.

Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation D - During Operation A - After Operation

W - Weekly

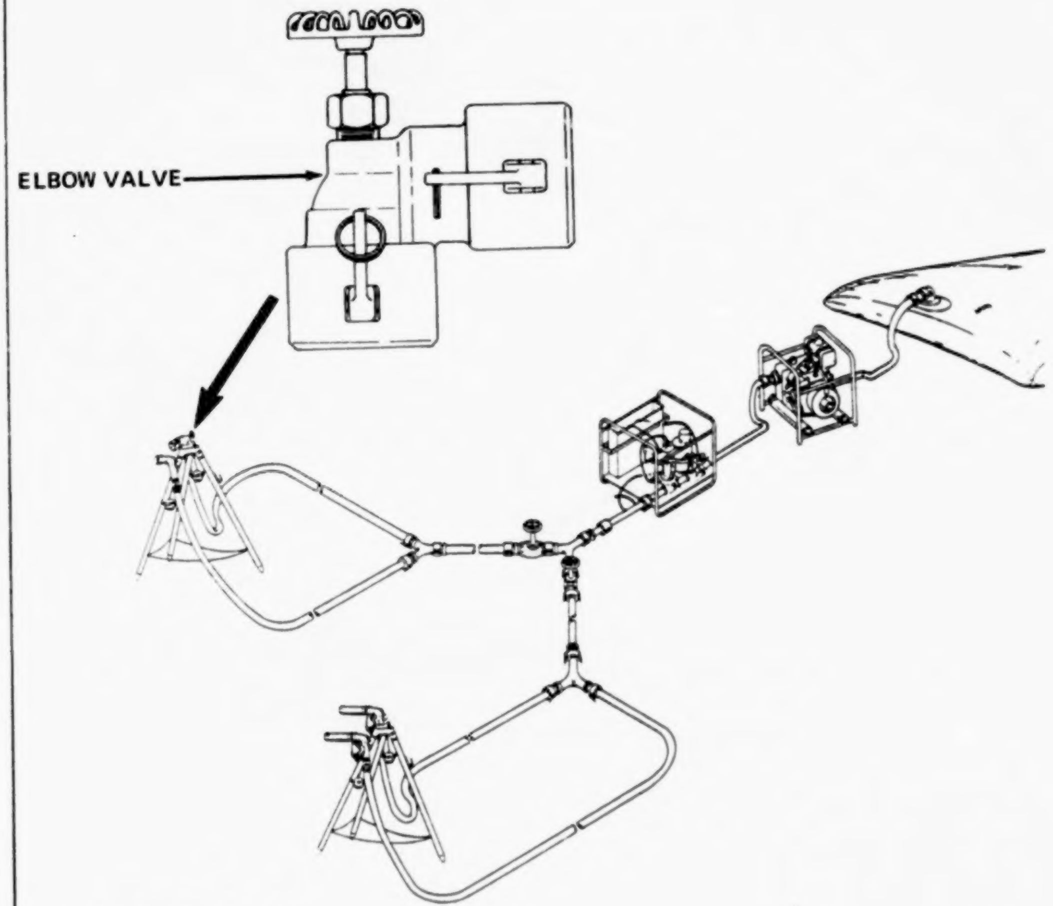
Item No.	Interval				Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
	B	D	A	W		
					DISTRIBUTION POINT 	
58	●	●			**Elbow Valves.** Check for damage, leaks, and improper operation. If valve is damaged, leaking, or not working properly, notify supervisor.	Valve is damaged, leaking, or not working properly.

Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation D - During Operation A - After Operation

W - Weekly

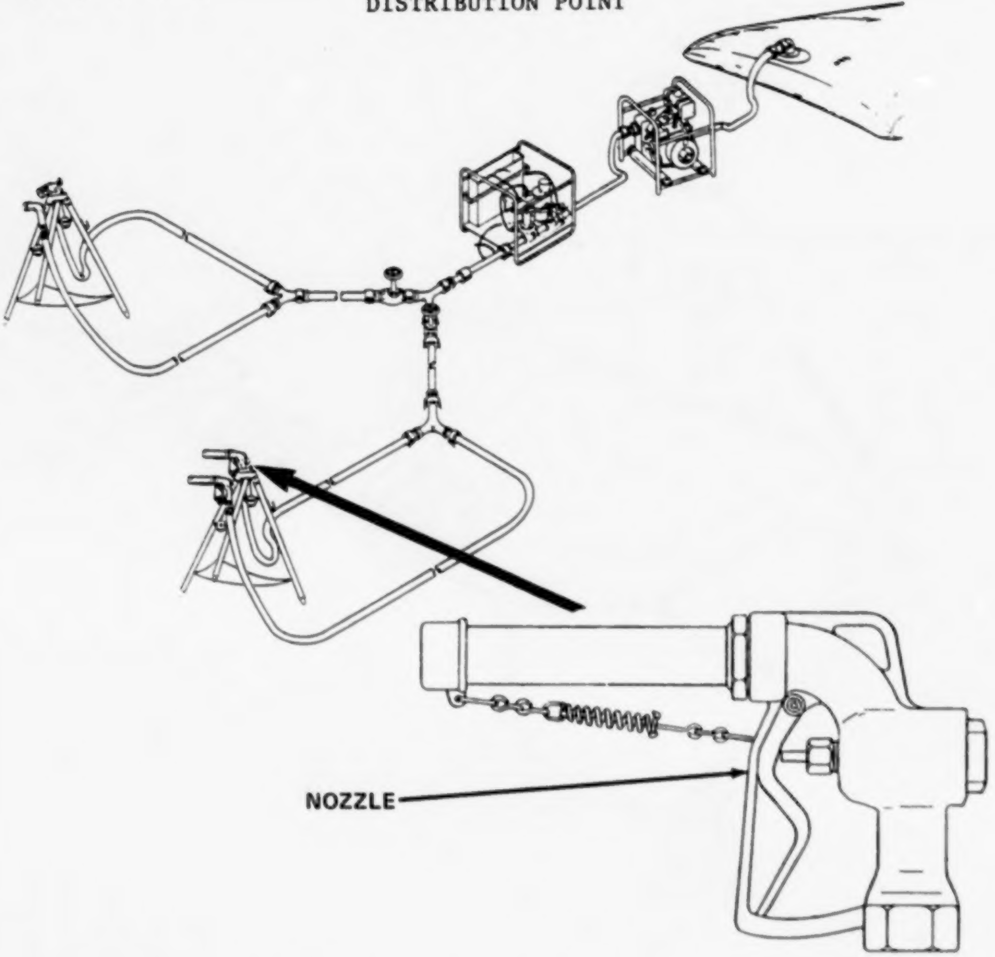
Item No.	Interval				Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
	B	D	A	W		
					DISTRIBUTION POINT  	
59	●	●			**Nozzles.** Check for damage and leaks. Make sure triggers work properly. If nozzle is damaged or leaking, or trigger is not working properly, notify supervisor.	Nozzle is damaged or leaking. Trigger is not working properly.

Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation D - During Operation A - After Operation

W - Weekly

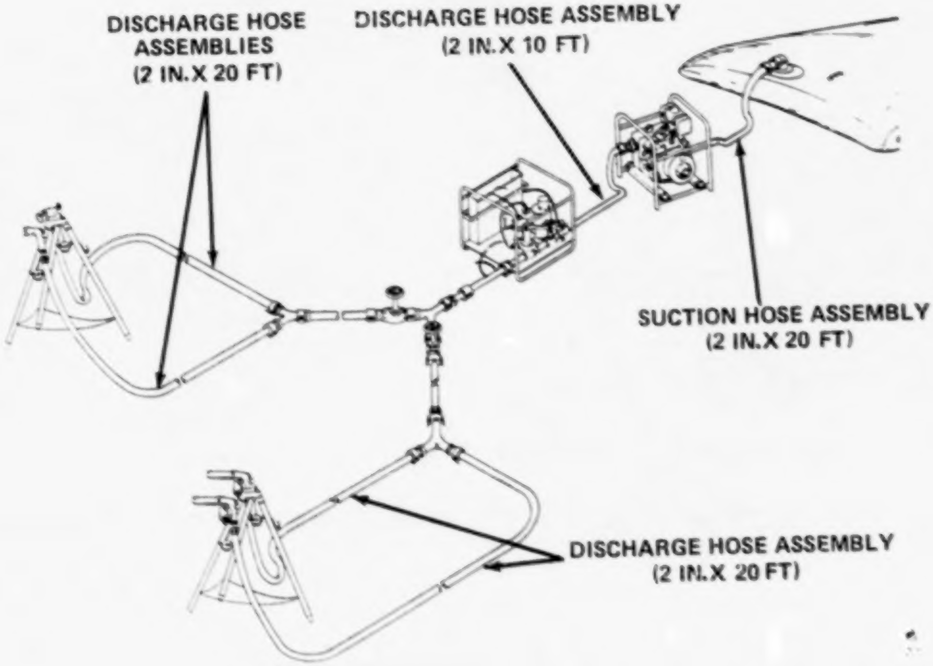
Item No.	Interval B	Interval D	Interval A	Interval W	Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
					DISTRIBUTION POINT  DISCHARGE HOSE ASSEMBLIES (2 IN.X 20 FT) DISCHARGE HOSE ASSEMBLY (2 IN.X 10 FT) SUCTION HOSE ASSEMBLY (2 IN.X 20 FT) DISCHARGE HOSE ASSEMBLY (2 IN.X 20 FT)	
60	•	•			**Hoses.** Check for loose connections. Disconnect and reinstall loose connections. Check for damage and leaks. If hose is damaged or leaking, notify supervisor.	Connection is loose. Hose is damaged or leaking.

Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation D - During Operation A - After Operation

W - Weekly

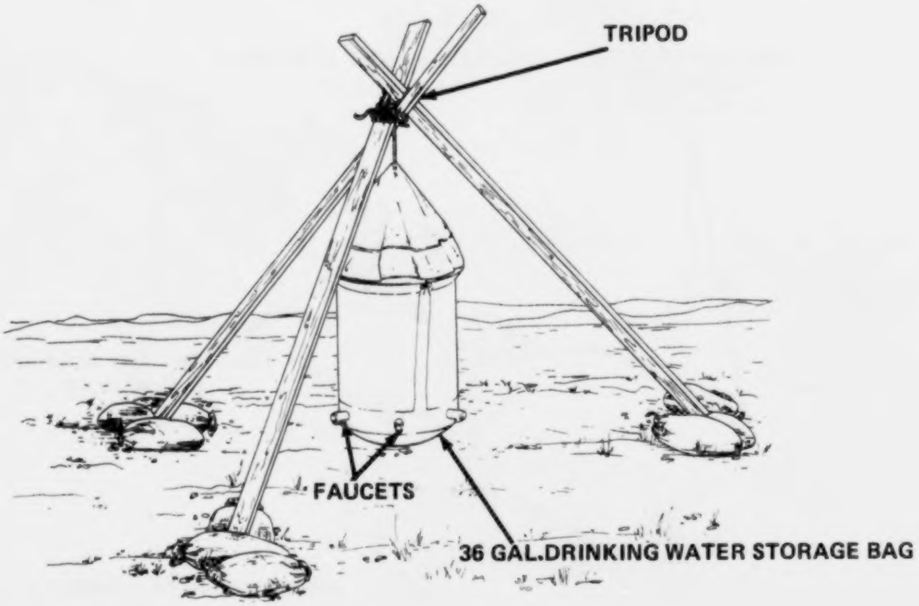
Item No.	Interval				Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
	B	D	A	W		
					DISTRIBUTION POINT  TRIPOD FAUCETS 36 GAL.DRINKING WATER STORAGE BAG	
61	•	•			**36-Gal. Drinking Water Storage Bag.** Check bag and faucets for damage and leaks. If bag or faucet is damaged or leaking, notify supervisor. Make sure bag has enough support.	Bag or faucet is damaged or leaking. Bag does not have enough support.

Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation D - During Operation A - After Operation

W - Weekly

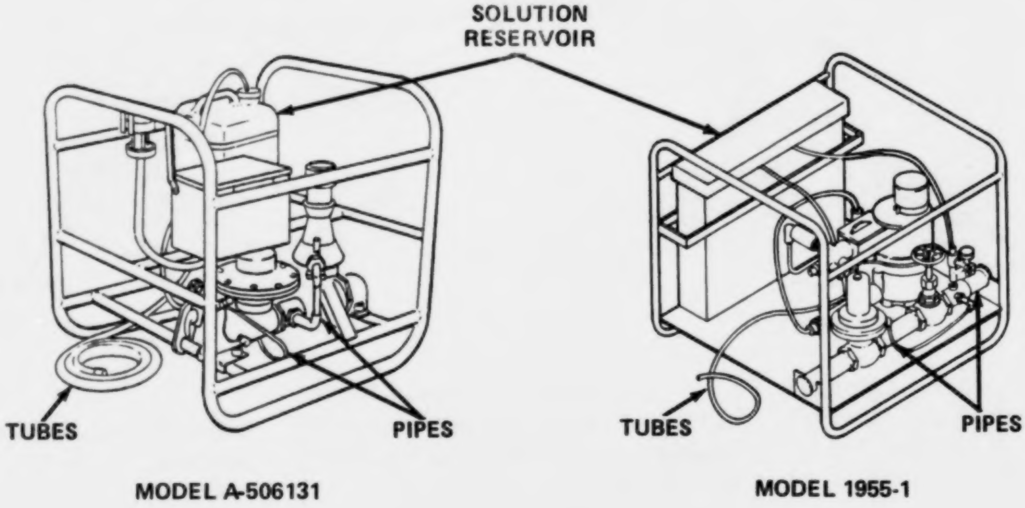
Item No.	Interval				Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
	B	D	A	W		
					HYPOCHLORINATION UNITS  MODEL A-506131 MODEL 1955-1	
62	•	•			**Pipes and Tubes.** Check pipes, tubes, and connections, for damage and leaks. If damaged or leaking, notify supervisor.	Pipe, tube, or connection is damaged or leaking.
63	•	•			**Solution Reservoirs.** Check solution level. Add solution as required (para 2-16). Check for damage and leaks. If damaged or leaking, notify organizational maintenance.	Not enough solution in reservoir. Reservoir is damaged or leaking.

Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation D - During Operation A - After Operation

W - Weekly

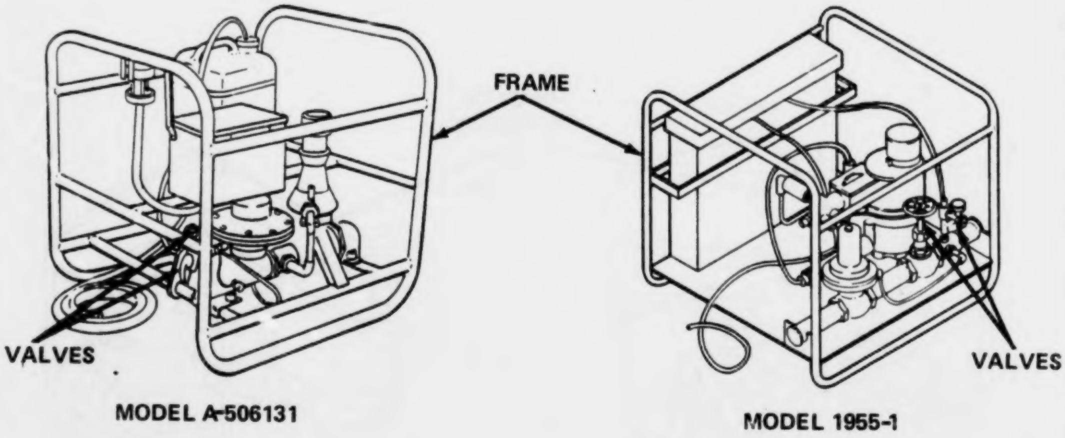
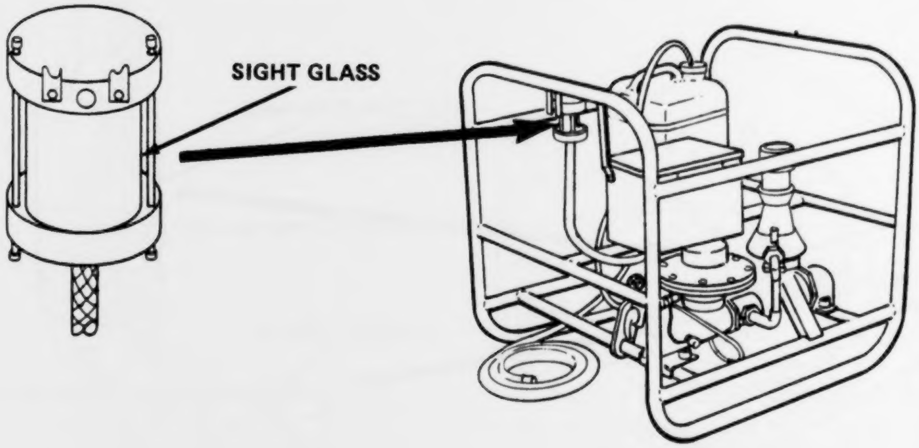
Item No.	Interval				Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
	B	D	A	W		
					HYPOCHLORINATION UNITS	
						
64	●	●			**Valves.** Check valves for damage, leaks, and improper operation. If valve is damaged, leaking, or not working properly, notify organizational maintenance.	Valve is damaged, leaking, or not working properly.
65	●				**Frame.** Inspect for cracks, damaged welds, and corrosion. If frame is damaged or corroded, notify organizational maintenance.	Frame is damaged.

Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation D - During Operation A - After Operation

W - Weekly

HYPOCHLORINATION UNIT: A-506131



Item No.	Interval B	D	A	W	Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
66	●	●			**Sight Glass.** Inspect for damage. During operation, check to make sure solution is being injected. If not, perform troubleshooting (table 3-1). If sight glass is damaged, notify organizational maintenance.	Sight glass is damaged. Solution is not being injected.

Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation D - During Operation A - After Operation

W - Weekly

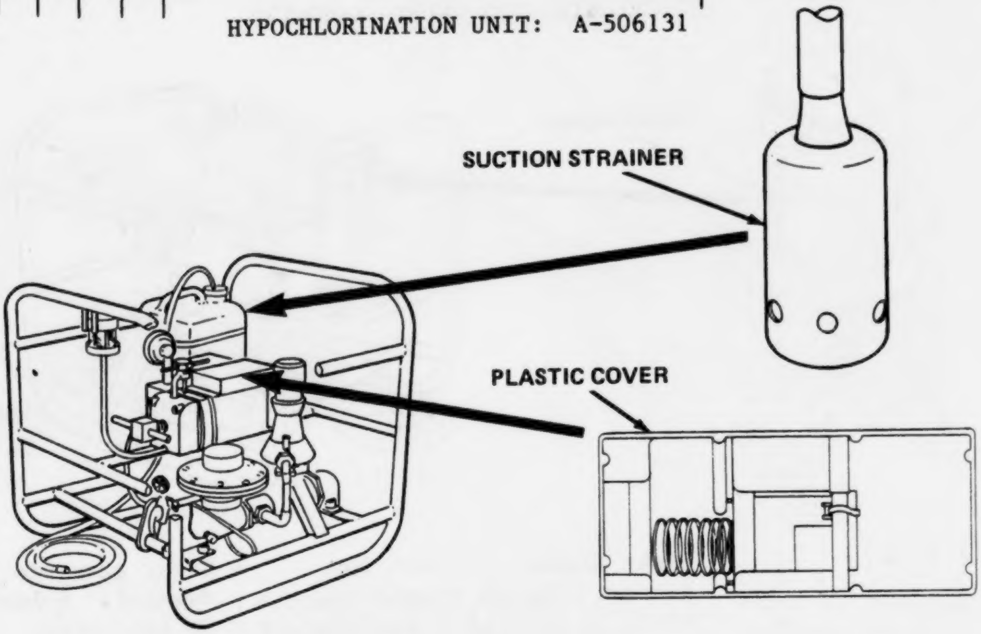
Item No.	Interval				Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
	B	D	A	W		
					HYPOCHLORINATION UNIT: A-506131 	
67	●				**Plastic Cover.** Check for damage. Check for proper installation. If cover is damaged, missing, or improperly installed, notify organizational maintenance.	Cover is damaged or missing.
68				●	**Suction Strainer.** Inspect strainer. Using soft brush, scrub and rinse if needed.	Strainer is clogged.

Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation D - During Operation A - After Operation

W - Weekly

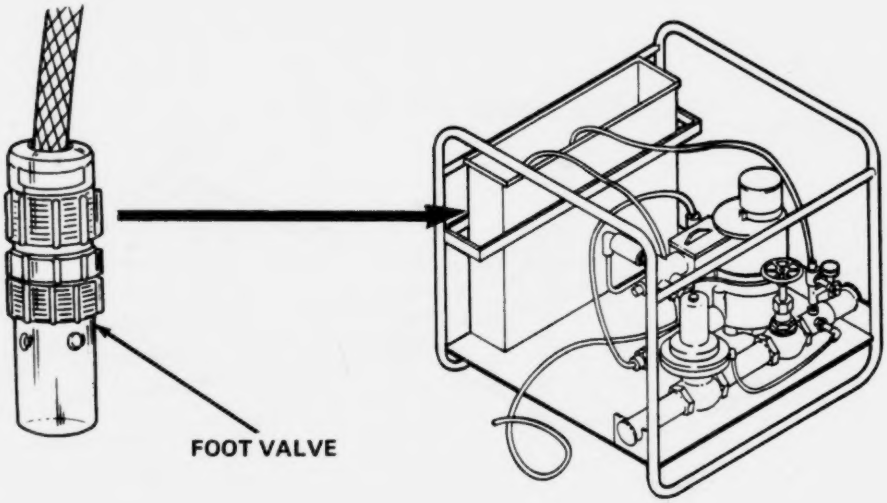
Item No.	Interval				Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
	B	D	A	W		
					HYPOCHLORINATION UNIT: 1955-1	
						
69				●	**Foot Valve.** Inspect foot valve. Using soft brush, scrub and rinse if needed.	Foot valve clogged.

Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation D - During Operation A - After Operation

W - Weekly

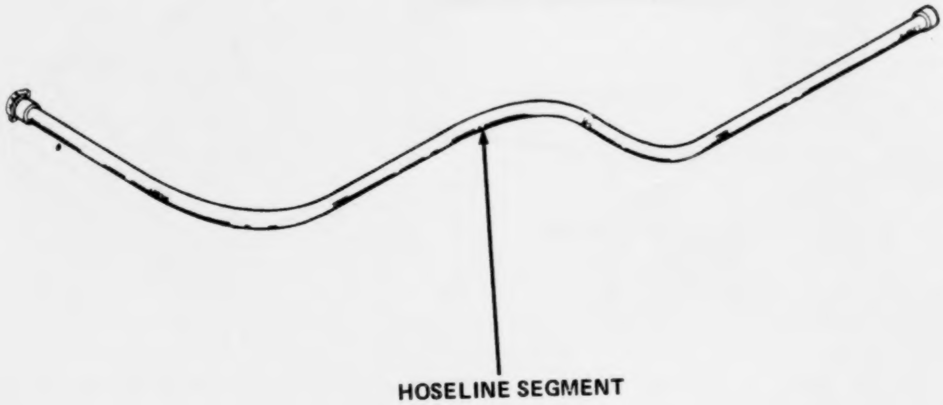
Item No.	Interval				Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
	B	D	A	W		
					10-MILE HOSELINE SEGMENT  	
70	●	●			**Hoseline.** Check for and tighten loose connections. Check for damage and leaks. If hoseline is damaged or leaking, notify supervisor. Check for rubbing or chafing against trees, rocks, suspension device tripods, or other objects that might damage hoseline. Reposition hose as required.	Connection is loose. Hoseline is damaged or leaking.

Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation D - During Operation A - After Operation

W - Weekly

Item No.	Interval B	D	A	W	Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
					10-MILE HOSELINE SEGMENT	
71	●	●			**Suspension Devices.** Check for damage. Check security of suspended hoseline. If suspension device is damaged or suspended hoseline is not secure, notify supervisor. Check for damaged or broken saddle assemblies. Make sure saddles are spaced at 5 ft intervals. Check wire rope for damage and fraying. Make sure wire rope is securely anchored. If wire rope is damaged, frayed, or not securely anchored, notify supervisor.	Suspension device damaged or suspended hoseline not secure. Saddle assemblies damaged or broken. Wire rope damaged, frayed, or not securely anchored.

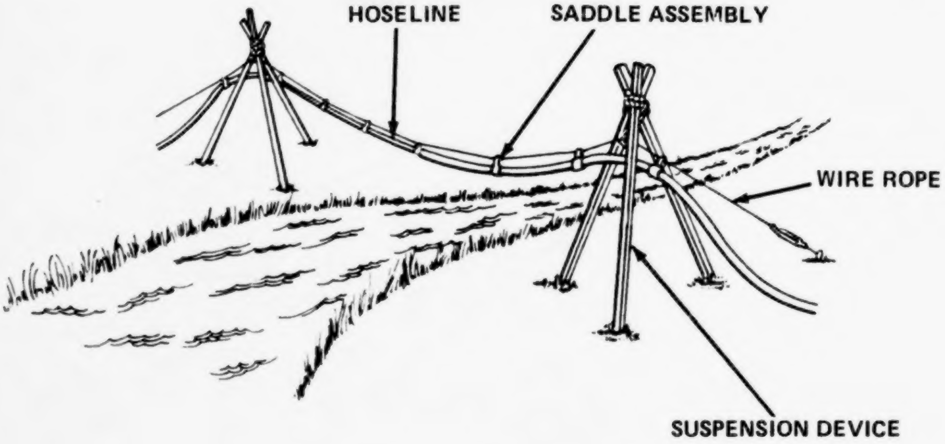


Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation D - During Operation A - After Operation

W - Weekly

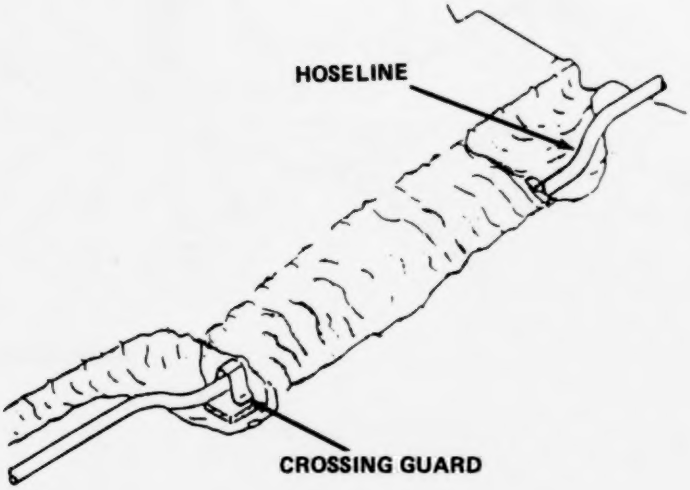
Item No.	Interval				Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
	B	D	A	W		
					10-MILE HOSELINE SEGMENT  	
72	●	●			**Road Crossing Guards.** Check to see that guards are providing enough protection to hoseline. If crossing guard has collapsed or hoseline is damaged, notify supervisor.	Road crossing guard is not providing enough protection to hoseline.

Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation D - During Operation A - After Operation

W - Weekly

Item No.	Interval B	D	A	W	Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
					10-MILE HOSELINE SEGMENT	
73	●	●			**Pressure-Reducing Valve.** Inspect skid for cracks and damaged welds. Inspect valve for damage and leaks. If skid is damaged, or valve is damaged or leaking, notify supervisor. Make sure isolation cock valves are open.	Skid has crack or damaged weld. Valve is damaged. Isolation cock valve is closed.

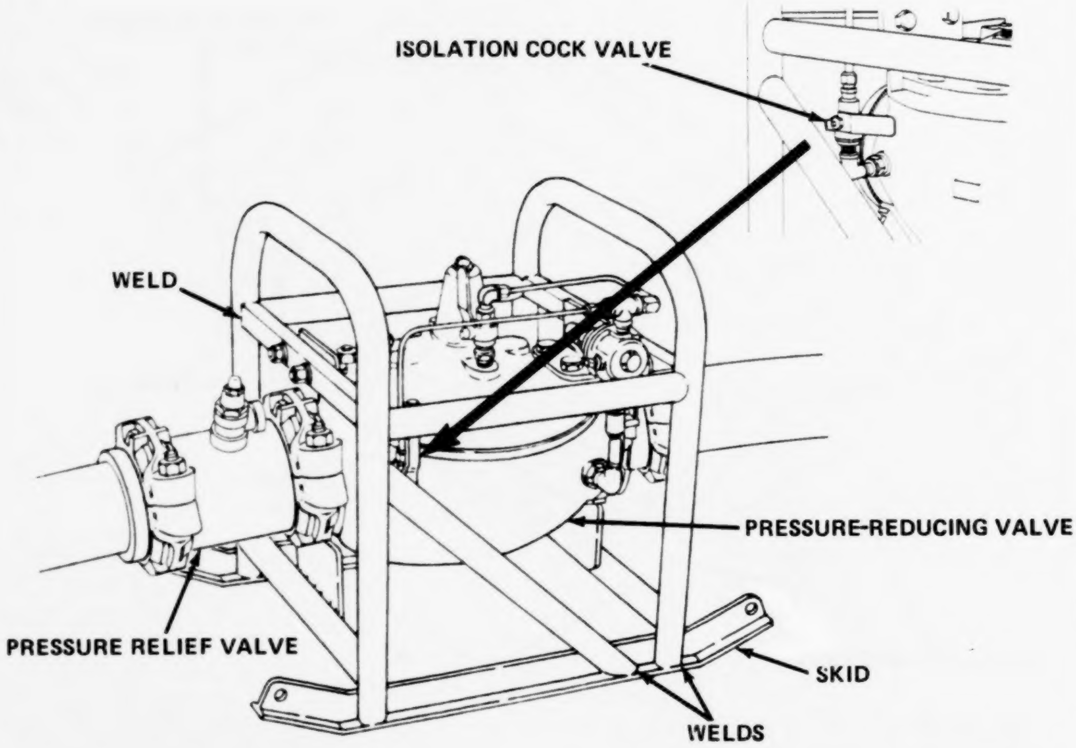

ISOLATION COCK VALVE
WELD
PRESSURE-REDUCING VALVE
PRESSURE RELIEF VALVE
SKID
WELDS

Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation D - During Operation A - After Operation

W - Weekly

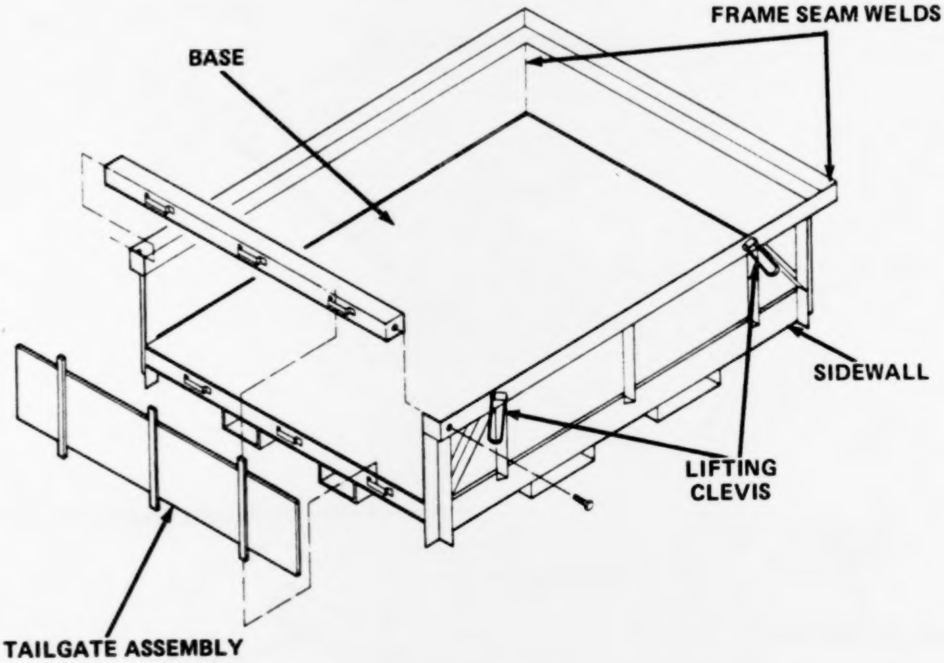
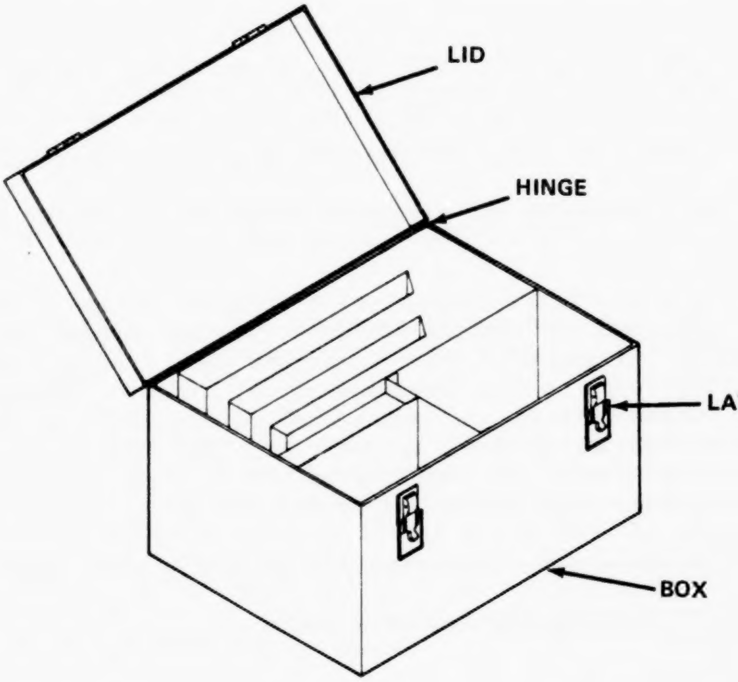
Item No.	Interval				Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
	B	D	A	W		
					10-MILE HOSELINE SEGMENT  FRAME SEAM WELDS BASE SIDEWALL LIFTING CLEVIS TAILGATE ASSEMBLY	
74	●		●		**Flaking Boxes.** Check all frame seam welds for damage. Inspect lifting clevises and clevis attach brackets for cracks, bends, or broken seam welds. Inspect tailgate assembly, side walls, and base for damage. If any of these items are damaged, notify supervisor.	Seam weld is damaged. Lifting clevis or attach bracket is damaged. Tailgate assembly is damaged.

Table 2-1. Preventive Maintenance Checks and Services (Cont)

B - Before Operation D - During Operation A - After Operation

W - Weekly

Item No.	Interval B	D	A	W	Item to Be Inspected Procedure	Equipment Is Not Ready/Available If:
					10-MILE HOSELINE SEGMENT  	
75	•				**Kits.** Inspect displacement and evacuation, packing, repair, and suspension kits for damage. Make sure items in each kit are clean and dry. Inspect each kit for missing or damaged items (appendix B). Check latches, hinges, lid, and box on each kit for damage. If kit or item in kit is damaged or missing, notify supervisor.	Item in kit damaged or missing.

Section III. OPERATION UNDER USUAL CONDITIONS

2-4. TWDS SITE LOCATION AND PUMP SPACING

a. Prior to installing TWDS equipment, a thorough study of the terrain is required. A general route for hoseline and general locations for the pumping stations, storage assemblies, and distribution points can be determined from examination and comparison of maps, photographs, and charts. Some elements to be considered in selecting a route and installation sites for TWDS are:

(1) Whether TWDS will operate independently or as part of a large system

(2) The assigned mission for TWDS (i.e., dispensing, storing, or transferring water)

(3) Expected length of time TWDS will be required to operate.

(4) Elevation differences and distances TWDS will encounter along its route.

b. Organize a ground reconnaissance prior to installation of TWDS to determine exact locations for pumping stations, storage assemblies, and distribution points. If possible, site locations should be near or parallel to existing roads to ease transportation, assembly, inspection, maintenance, and disassembly of the system. Avoid routes along the banks of streams, marshes, ponds, gulleys, ravines, or other areas subject to flooding. Whenever possible, the hoseline should be laid out on firm, dry, level ground that allows easy access and is not subject to flooding.

c. Minimum requirements for selecting the route are as follows:

(1) A sketch of the proposed hoseline route

(2) Odometer distances

(3) Enough topographic information (surveying altimeter elevations) to establish relative altitude at various points along the hoseline route.

d. The following guidelines should be utilized to gain maximum effectiveness for installation and operation of the system:

(1) The route should be direct and present a minimum number of obstacles and obstructions.

(2) A route parallel to a secondary all-weather road is preferable to one along a heavily traveled road.

(3) If roadways do not exist or cannot be utilized, select a route that is accessible to vehicles required for laying the hoseline.

2-4. TWDS SITE LOCATION AND PUMP SPACING (CONT)

(4) Plan to locate junction of two hoseline lengths at installation sites for each boost pumping station and storage assembly.

(5) Keep security precautions in mind. Utilize natural camouflage wherever possible and avoid routing hoseline through populated areas.

e. In selecting pumping station installation sites, the location of the lead or first pumping station will be determined by location of the water source. Boost pumping stations are intended to be spaced at approximately two mile intervals, assuming that the route is reasonably direct and the terrain is level. However, a substantial rise or fall in elevation along the hoseline route may require adjustment of standard spacing intervals:

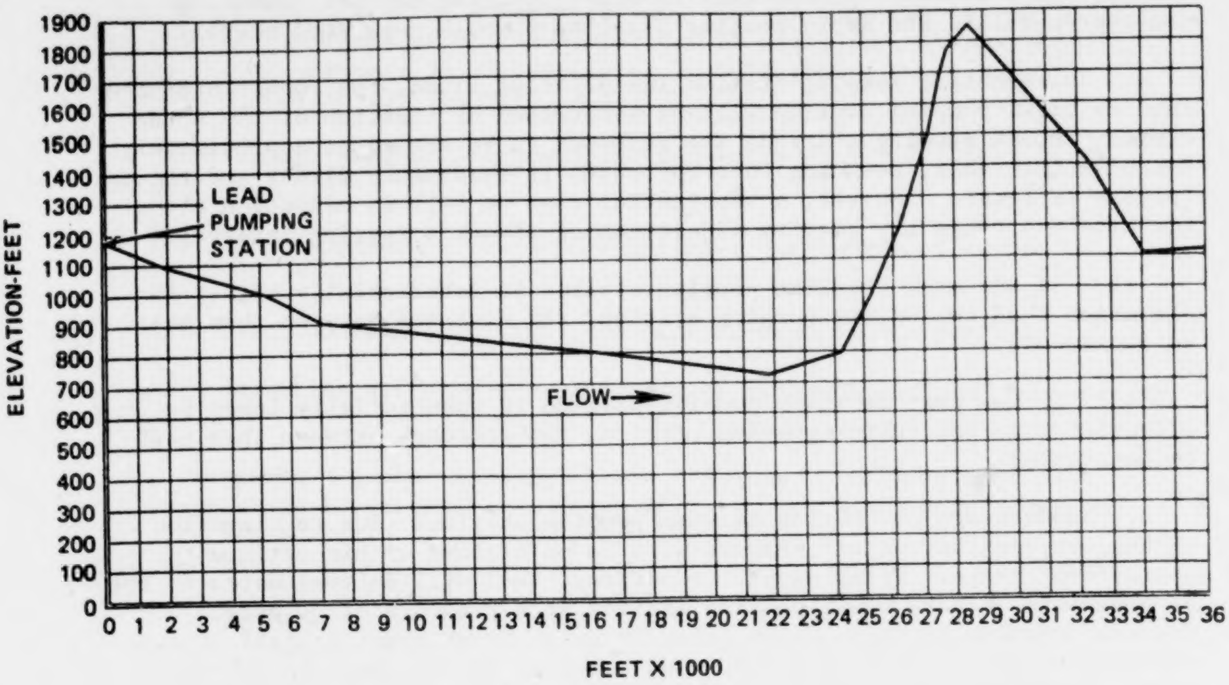
(1) If the next downline pumping station is substantially higher in elevation than the upline pumping station, the distance between them must be shortened.

(2) If the next downline pumping station is substantially lower in elevation than the upline pumping station, the distance between them must be lengthened.

f. Adjustments to spacing between pumping stations (due to elevation change) assure that water pressure will be maintained within optimum operational range. Under normal conditions, TWDS will deliver water to the suction port of each boost pumping station at a pressure of 20 psig. Whenever suction pressure falls below 20 psig, boost pumping stations are designed to begin reducing speed, when operated in the electric automatic mode. Therefore, if an upline pumping station is substantially lower than the next downline station, and the elevation difference has not been offset by spacing adjustment, suction pressure at the downline pumping station may fall below 20 psig and cause that pump to slow down. This in turn will cause remaining downline boost pumping stations to slow down, seriously degrading overall performance of TWDS.

g. A ground profile (drawn on graph paper) and a pump spacing triangle can be utilized to determine the location of each boost pumping station. To construct a ground profile, first obtain a topographical map or other source material which provides accurate information concerning terrain along projected hoseline route. Then, using this information, draw a ground profile of the hoseline route on graph paper as follows:

2-4. TWDS SITE LOCATION AND PUMP SPACING (CONT)



(1) Divide the horizontal base of the graph into spaces that represent uniform distances, such as 1000 ft intervals. However, any suitable scale can be used. The base of the graph represents the horizontal distance that the hoseline will cross.

(2) Divide the vertical, left-hand edge of the graph into spaces that represent uniform changes in elevation, such as 100 ft intervals. Again, any suitable scale can be used. However, the scale must include at least the highest and lowest elevations along the hoseline route.

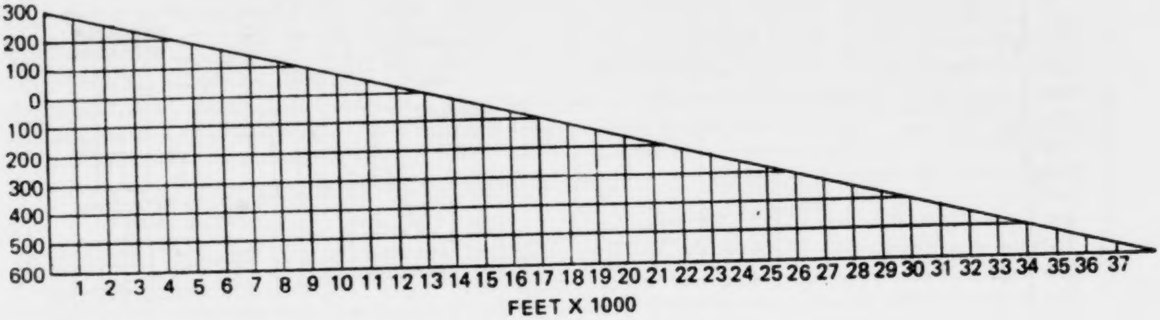
(3) At the left-hand edge of the graph, mark a point that represents the elevation of the lead pumping station.

(4) Continuing across the graph, mark points where significant changes in elevation occur along the hoseline route.

(5) To complete the ground profile, join the points marked on the graph with a straight line.

2-4. TWDS SITE LOCATION AND PUMP SPACING (CONT)

h. To construct a spacing triangle, obtain a piece of paper, transparent sheet, or cardboard thick enough to be used as a straightedge. Then proceed as follows:



(1) Divide the horizontal base of the triangle into spaces on the same uniform scale used to divide the base of the ground profile graph. Mark off spaces along the triangle base to at least 39,000 ft.

(2) Divide the vertical, left-hand edge of the triangle into spaces on the same uniform scale used to represent elevation changes on the ground profile. Mark off spaces along the vertical side of the triangle as follows:

(a) Zero represents the elevation of the pumping station.

(b) The upper left-hand corner represents 300 ft above the pumping station

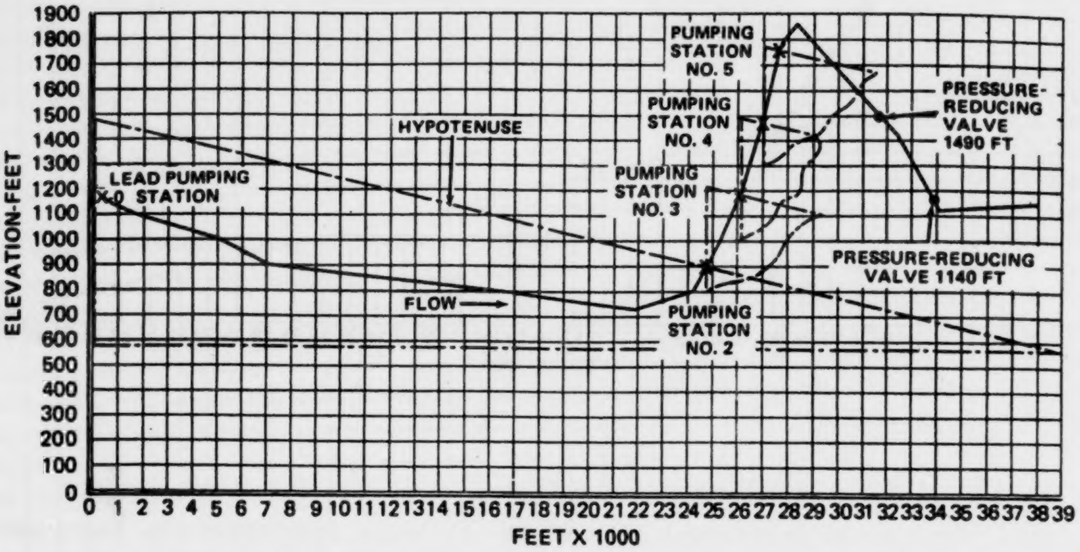
(c) The lower left-hand corner represents 600 ft below the pumping station

(3) Draw a straight, diagonal line from the 300 ft mark on the vertical scale to the 39,000 ft mark on the horizontal scale. This line will form the hypotenuse or long side of the triangle.

(4) Making sure all lines have a straight edge, cut the triangle along the three sides drawn (horizontal, vertical, and diagonal).

2-4. TWDS SITE LOCATION AND PUMP SPACING (CONT)

i. Using the ground profile and pump spacing triangle, determine the location of the first boost pumping station as follows:



(1) Place the pump spacing triangle on the ground profile.

(2) Aline the vertical side of the pump spacing triangle with the vertical (elevation) side of the ground profile, so that the zero mark of the spacing triangle is on the lead pumping station mark of the ground profile.

(3) Make sure the horizontal side of the spacing triangle is exactly parallel with the horizontal base of the ground profile. Horizontal spacing marks on both the pump spacing triangle and ground profile should be exactly alined.

(4) Mark the point at which the hypotenuse (or long side of the spacing triangle) crosses the ground profile. This will be the location of the first boost pumping station.

2-4. TWDS SITE LOCATION AND PUMP SPACING (CONT)

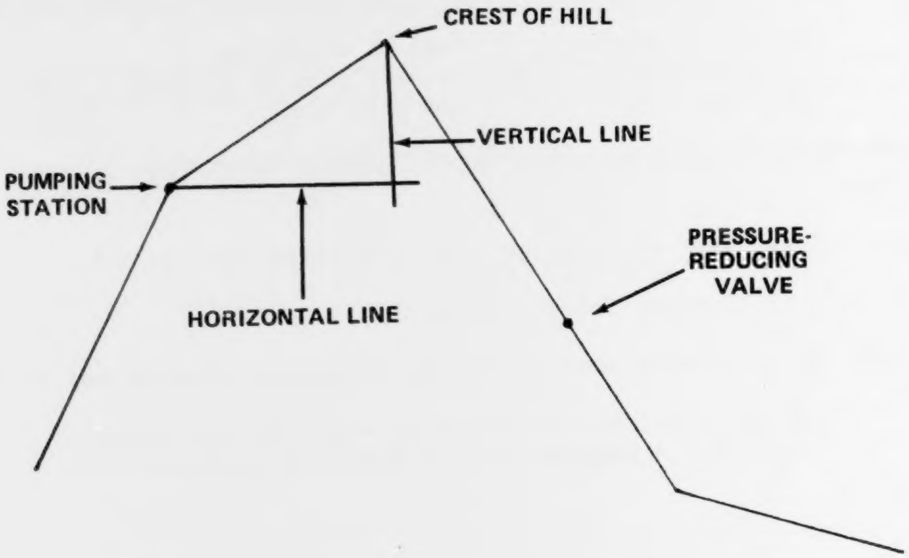
NOTE

> If level of ground profile is below base of pump spacing triangle, extend the line of the spacing triangle hypotenuse until it crosses the ground profile.

j. To determine the location of the second boost pumping station, place the zero mark of the spacing triangle on the first boost pumping station mark of the ground profile. Mark the point at which the spacing triangle hypotenuse crosses the ground profile. This will be the location of the second boost pumping station. Locations of successive boost pumping stations are determined in the same way.

k. After locations of pumping stations have been plotted, check ground profile for any sharp declines in elevation along hoseline route. An excessive drop in elevation will significantly increase the pressure of water as it flows downhill. If pressure builds to 225 psig, hoseline can rupture and equipment failure will result. Therefore, when the ground profile indicates a sharp elevation drop along the route, a pressure-reducing valve must be installed in the hoseline.

l. To determine the location of the pressure-reducing valve, refer to the ground profile and proceed as follows:



(1) Mark crest of hill on ground profile.

2-4. TWDS SITE LOCATION AND PUMP SPACING (CONT)

(2) Draw a vertical line downward from the hill crest.

(3) Determine location of pumping station closest to the crest (on uphill side).

(4) Draw a horizontal line outward from pumping station until it intersects the vertical line.

(5) Measure footage of horizontal line and footage of vertical line.

(6) Using formula provided below, determine total hoseline footage between pumping station and hill crest:

$$\text{Total hoseline footage} = \sqrt{a^2 + b^2}$$

(a = horizontal line footage)
(b = vertical line footage)

(7) Using formula provided below, determine friction loss of total hoseline footage in terms of vertical feet:

$$\text{Total hoseline footage} \times 0.024 = \text{Vertical feet of friction loss in hoseline}$$

(0.024 = friction loss conversion factor)

(8) Using formula provided below, determine total feet of friction loss:

$$\text{Vertical feet of friction loss in hoseline} + \text{Feet of elevation between pumping station and hill crest} = \text{Total feet of friction loss}$$

(9) Using formula provided below, convert total feet of friction loss into psi:

$$\frac{\text{Total feet of friction loss}}{2.31} = \text{friction loss in psi}$$

(2.31 = psi conversion factor)

(10) Using formula provided below, determine existing psi at hill crest:

$$150 \text{ psi} - \text{psi of friction loss} = \text{psi at hill crest}$$

(150 psi = pumping station discharge pressure)

2-4. TWDS SITE LOCATION AND PUMP SPACING (CONT)

(11) Using formula provided below, determine allowed additional psi before safety limit is reached:

225 psi - psi at hill crest = Allowed additional psi before reaching safety limit

(225 psi = safety limit of pressure)

(12) Using formula provided below, convert allowed additional psi into vertical feet:

Allowed additional psi x 2.31 = Allowed additional vertical footage before reaching safety limit

(2.31 psi = vertical footage conversion factor)

(13) Using formula provided below, determine point at which pressure-reducing valve must be installed in hoseline:

Altitude at hill crest - Allowed additional vertical footage = Pressure-reducing valve installation point

m. If elevation continues to drop excessively beyond first pressure-reducing valve installation point, a second pressure-reducing valve must be installed in hoseline. Using formula provided below, determine point at which second pressure-reducing valve must be installed in hoseline:

Altitude at first pressure-reducing valve installation point - 346.5 = Second pressure-reducing valve installation point

(346.5 = allowed additional vertical footage before reaching safety limit)

2-5. ASSEMBLY AND PREPARATION FOR USE: GENERAL

a. Packing Groups. TWDS consists of four equipment groups divided into eight packing groups. The packing groups contain a total of 47 crates. The crates are plywood-sheathed, skidded, and equipped with headers for using a forklift. The crates are marked with names of equipment and packing group to which they belong. To unpack the TWDS, perform unpacking procedures that apply to each equipment group. The equipment used will depend on the specific mission of TWDS. Unpack only those components needed to complete the mission.

b. Pumping Stations. The six trailer-mounted pump assemblies are protected by plywood caps that rest on the trailer rails and are fastened to the unit by banding straps. All other components necessary to complete the assembly of the six pumping stations are in a crate marked PUMPING STATIONS. Load this crate on the back of the truck used to tow the first trailer-mounted pump assembly to the lead pumping station installation site. Tow crate and pump to installation site for lead pumping station. Transport remaining trailer-mounted pump assemblies (boost pumping stations) to their respective installation sites.

c. Storage Assemblies. Components for the storage assemblies are packed in three crates. Two crates are marked TANK, FABRIC, COLLAPSIBLE, 20K GALLON. Each of these two crates contains one 20,000 gal. collapsible storage tank along with valves and fittings required for tank installation. The third crate contains all other components for two storage assemblies. This crate is marked STORAGE ASSEMBLY. Transport these three crates to the first storage assembly site.

d. Distribution Points. Components for distribution points are packed in three crates. Two of these crates contain a 125 gpm pump and are marked PUMP, CENTRIFUGAL, 125 GPM. The third crate contains all other components needed to complete assembly of two distribution points. This crate is marked DISTRIBUTION POINT. Transport the three distribution point crates to the first storage assembly site.

e. 10-Mile Hoseline Segment. Components of the 10-mile hoseline segment are packed in 34 crates. Thirty-three crates contain hoseline and are marked HOSE ASSEMBLY, 6 INCH, 500 FEET. Each crate contains four flaking boxes; each flaking box contains one 500 ft hose assembly. The remaining crate is marked 10-MILE SEGMENT. It contains all other components needed for installation of the 10-mile hoseline segment. Begin unpacking the 10-mile hoseline segment by transporting these crates to the area of the lead pumping station.

f. General Unpacking Instructions

(1) Be careful during unpacking not to damage container contents or packing materials.

2-5. ASSEMBLY AND PREPARATION FOR USE: GENERAL (CONT)

(2) Remove lid from crate. As required, remove blocking, bracing, and anchoring securing contents within crate.

(3) Save all packing materials and store them in their opened containers after removal of contents.

(4) Return unused components to crates.

(5) Return all fiberboard and plywood boxes to original crates.

(6) Retain all packing materials at installation site. This will speed repacking when moving to a new site or returning to storage.

g. Inspection of Unpacked Components

PUMPING STATIONS

Qty	Size	Item	Inspection
18	6 in.	Butterfly valve	Check gear-actuated handle for smooth operation. Make sure disc operates freely.
6	6 in.	Check valve	Make sure assembly is tight. Check for loose, missing, or damaged nuts.
6	6 in. x 10 ft	Discharge hose assembly	Inspect hose for punctures, cuts, or scrapes. Make sure bands that secure adapters are tight.
6	6 in. x 20 ft	Discharge hose assembly	(Same as above.)
6	6 in. x 75 ft	Discharge hose assembly	(Same as above.)
48	6 in.	Grooved pipe coupling	Check for damaged or missing gasket. Check for damaged or missing bolts and nuts.
12	6 in.	Lateral grooved pipe fitting	Check for damage to sealing surfaces.

2-5. ASSEMBLY AND PREPARATION FOR USE: GENERAL (CONT)

Qty	Size	Item	Inspection
6	6 in.	Pressure relief valve and nipple	Check for cracked or broken parts. Make sure relief valve is firmly seated in nipple.

STORAGE ASSEMBLY

Qty	Size	Item	Inspection
32	UNC-2A x 3.25 in.	Bolt	Check for worn, stripped, or damaged threads.
2	4 in.	Coupling half, female, quick-disconnect	Make sure cam arms move freely. Check for damaged or missing gasket.
2	4 in.	Coupling half, male, quick-disconnect	Check for stripped or worn threads.
2	4 in.	Coupling pipe fitting	Check for stripped or worn threads.
8	4 in. x 10 ft	Discharge hose assembly, quick-disconnect	Inspect hose for punctures, cuts, or scrapes. Make sure cam arms move freely. Check for damaged or missing threads.
2	4 in.	Flange adapter	Check for damage to sealing surfaces.
64	0.046 ID x 0.812 OD	Flatwasher	
4	4 in., Class 150	Gasket	Check for tears, punctures, or other damage.
2	4 in.	Gate valve, flanged	Make sure assembly is tight. Check for loose, damaged, or missing nuts and bolts. Make sure handwheel is firmly secured to valve stem.

2-5. ASSEMBLY AND PREPARATION FOR USE: GENERAL (CONT)

Qty	Size	Item	Inspection
2	4 in.	Grooved pipe coupling	Check for damaged or missing gasket. Check for damaged or missing bolts and nuts.
2	6 in.	Grooved pipe coupling	(Same as above.)
32	0.375 16 UNC-2B	Hexnut	Check for stripped or worn threads.
32	0.375 in.	Lockwasher	
2	6 in. x 6 in. x 4 in.	Reducing tee	Check for damage to sealing surfaces.

TANK, FABRIC, COLLAPSIBLE, 20K GALLON

Qty	Size	Item	Inspection
1	1/2 in.	Gate valve	Check for stripped or worn threads. Make sure handwheel is firmly secured to valve stem and operates smoothly.
1		Repair items	Check for damaged or missing items (listed in appendix B). Inspect sealing clamps for dents, missing wing nuts, and worn or stripped threads. Inspect plugs for worn or damaged threads.
1		Repair kit	Check kit contents (listed in appendix B) for damaged or missing items. Check shelf life of adhesives and adhesive patches.
1	20,000 gal.	Storage tank, collapsible	Inspect tank for punctures and tears. Inspect elbow, air vent, and drain fittings for damaged or missing parts. Make sure chains secure dust caps to

2-5. ASSEMBLY AND PREPARATION FOR USE: GENERAL (CONT)

Qty	Size	Item	Inspection
			fittings. Make sure cam arms on dust caps move freely. Check for damaged or missing gaskets.
1	4 in. x 90°	Filler/discharge elbow, male to female, quick-disconnect	Make sure cam arms move freely. Check for damaged or missing gaskets.
1	4 in. x 90°	Filler/discharge elbow, female to female, quick-disconnect	(Same as above.)
1	3/4 in.	Suction hose	Check for stripped or worn threads. Make sure bands that secure adapters are tight. Inspect hose for punctures and tears.
1		Vent assembly, quick-disconnect	Inspect for missing parts. Make sure pipe is tightly screwed into coupling and relief valve is tightly screwed into pipe. Check cap on relief valve for smooth operation. Make sure cam arms move freely. Check for damaged or missing gasket.

DISTRIBUTION POINT

Qty	Size	Item	Inspection
2		Color comparator kit	Check kit for damaged or missing contents. Check shelf life of chemicals. Make sure lock securely fastens lid on kit.
8	2 in.	Coupling half, 200-B	Check for stripped or worn threads. Make sure cam arms move freely. Check

2-5. ASSEMBLY AND PREPARATION FOR USE: GENERAL (CONT)

Qty	Size	Item	Inspection
			for damaged or missing gasket.
8	2 in.	Coupling half, 200-F	Check for stripped or worn threads. Make sure assembly is tight.
2	2 in. x 10 ft	Discharge hose assembly	Inspect hose for punctures, cuts, or scrapes. Make sure cam arms move freely. Check for damaged or missing gasket.
14	2 in. x 20 ft	Discharge hose assembly	(Same as above.)
4		Drinking water storage bag, 36 gal.	Inspect bag for punctures, tears, and worn areas. Check for broken or missing faucets. Make sure faucets operate smoothly.
4	2 in.	Dust plug, quick-disconnect, 200-DP	
4	2 in. x 2 in.	Elbow valve	Make sure cam arms move freely. Check for damaged or missing gasket. Make sure handwheel is firmly secured to valve stem and operates smoothly.
4	2 in.	Gate valve	Check for stripped or worn threads. Make sure handwheel is firmly secured to valve stem and operates smoothly.
2	100 gpm	Hypochlorination unit	
2	2 in. x 20 ft	Suction hose assembly	Inspect hose for punctures, cuts, or scrapes. Make sure cam arms move freely. Check for damaged or missing gasket.

2-5. ASSEMBLY AND PREPARATION FOR USE: GENERAL (CONT)

Qty	Size	Item	Inspection
4		Nozzle	Check for stripped or worn threads. Make sure trigger mechanism operates smoothly.
4		Nozzle stand assembly	Inspect assembly for bent or damaged legs. Check for missing, broken, or unconnected chains. Inspect chain attachment and hook welds for cracks or separation.
4	2 in. x 1.5 in.	Reducer, quick-disconnect, threaded, 2015-B	Make sure cam arms move freely. Check for damaged or missing gasket. Check 2015-B reducers for stripped or worn threads.
4	2 in. x 1.5 in.	Reducer, quick-disconnect, 2015-DA	(Same as above.)
2	2 in. x 3 in.	Reducer, quick-disconnect, 2030-DA-AL	(Same as above.)
2	2 in. x 4 in.	Reducer, quick-disconnect, 2040-DA-AL	(Same as above.)
2	4 in. x 2 in.	Reducer, quick-disconnect, 4020-DA	(Same as above.)
6	2 in. x 2 in. x 2 in.	Y-connection, quick-disconnect	Make sure cam arms move freely. Check for damaged or missing gasket.

10-MILE SEGMENT

Qty	Size	Item	Inspection
1	6 in.	Coupling half, quick-disconnect, female	Check for stripped or worn threads. Make sure cam arms move freely. Check for damaged or missing gasket.

2-5. ASSEMBLY AND PREPARATION FOR USE: GENERAL (CONT)

Qty	Size	Item	Inspection
1	6 in.	Coupling pipe fitting	Check for stripped or worn threads.
2		Displacement and evacuation kit	Inspect kit chest for broken handles, latches, and hinges. Open chest and check inner partitions for broken seam welds. Check kit contents (listed in appendix B) for damaged or missing items.
1	6 in.	End cap	Check for damage to sealing surfaces.
15	6 in.	Grooved pipe coupling	Check for damaged or missing gasket. Check for damaged or missing bolts and nuts.
1		Lifting sling	Inspect lifting sling ring for cracks or breaks. Inspect U-bolt for cracks, breaks, and looseness. Inspect lower cables to spreader bar rings for broken strands, worn thimbles, and loose clips. Inspect four lift hooks for cracks, breaks, or distortions. Inspect wire cable for broken strands, worn cable thimbles at rings and eyes, and loose cable clips.
1		Packing kit	Inspect kit chest for broken handles, latches, and hinges. Open chest and check inner partitions for broken seam welds. Check contents in each kit (listed in appendix B) for damaged or missing items.

2-5. ASSEMBLY AND PREPARATION FOR USE: GENERAL (CONT)

Qty	Size	Item	Inspection
1		Pressure-reducing valve	Inspect skids for broken welds. Inspect valve for bent or broken tubing, missing parts, or other damage. Make sure valve is properly attached to skid.
1	6 in.	Pressure relief valve and nipple	Inspect relief valve and nipple for cracked or broken parts. Make sure valve is firmly seated in nipple.
1		Repair kit	Inspect kit chest for broken handles, latches, and hinges. Open chest and check inner partitions for broken seam welds. Check contents in each kit (listed in appendix B) for damaged or missing items.
24	6 in.	Road crossing guards	Inspect guards for cracks, dents, or other damage.
4	1-1/4 in.	Socket wrench	Inspect for servicability.
2	1-1/16 in.	Socket wrench	Inspect for servicability.
4		Socket wrench handle	Inspect for servicability.
12	6 in. x 10 ft	Suction hose assembly	Inspect hose for punctures, cuts, or scrapes. Make sure cam arms move freely. Check for damaged or missing gasket.

NOTE

Some suspension kits may contain a round stake and chain hoist for installation.

Qty	Size	Item	Inspection
5		Suspension kit	Inspect kit chest for broken handles, latches, and hinges. Open chest and check inner partitions for

2-5. ASSEMBLY AND PREPARATION FOR USE: GENERAL (CONT)

Qty	Size	Item	Inspection
			broken seam welds. Check contents in each kit (listed in appendix B) for damaged or missing items.
65	6 in.	Swivel joint and coupling	Check for smooth swivel operation. Check for damaged or missing gasket. Check for damaged or missing bolts and nuts.
1	6 in. x 4 in. x 4 in.	Y-connection reducer	Inspect reducer assembly for missing parts. Make sure coupling pipe fitting is tightly screwed into male quick-disconnect coupling half. Inspect grooved pipe couplings for tightness. Make sure female quick-disconnect couplings are tightly screwed onto reducer pipe fittings. Make sure cam arms move freely. Check for damaged or missing gaskets on quick-disconnect and grooved pipe couplings.

HOSE ASSEMBLY, 6 INCH, 500 FEET

Qty	Size	Item	Inspection
132		Flaking box	Inspect all accessible frame seam welds for cracks or separated metal. Inspect four lifting clevises for cracks or distortions. Inspect four clevis attach brackets for cracked holes and cracked or separated seam welds. Inspect tailgate assembly for cracks, breaks, holes, or any other defects.

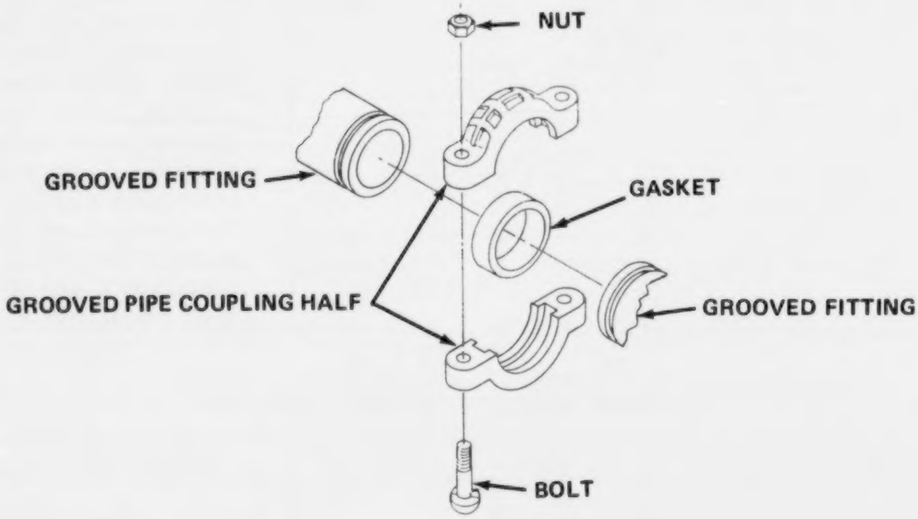
2-5. ASSEMBLY AND PREPARATION FOR USE: GENERAL (CONT)

Qty	Size	Item	Inspection
132	6 in. x 500 ft	Hose assembly, collapsible	Inspect hose for punctures, cuts, or scrapes. Make sure bands that secure adapters are tight.

2-6. GROOVED PIPE COUPLING INSTALLATION

NOTE

This is a general procedure for installation of grooved pipe couplings throughout the system. Follow this procedure when using a grooved pipe coupling to connect two TWDS components.



1 Disassemble grooved pipe coupling by removing two nuts, two bolts, coupling halves, and gasket.

2 Check gasket for damage. If gasket is damaged, replace it.

3 Apply thin coat of silicone lubricant (item 6, appendix D) to gasket lips and outside of gasket.

4 Place gasket over grooved fitting on first component, being sure that it does not overhang end of fitting.

2-6. GROOVED PIPE COUPLING INSTALLATION (CONT)

5 Aline end of second grooved fitting with first one. Slide gasket to center position between grooves. No portion of gasket should overhang grooves.

6 Place coupling halves over gasket. Make sure that coupling half keys are in grooves.

7 Install two bolts. Place nuts on bolts and hand-tighten.

CAUTION

Overtightening nuts may cause gasket to pinch. Tighten nuts only until coupling halves are firmly together (metal-to-metal).

8 Tighten nuts alternately and equally until coupling halves are firmly together.

2-7. ASSEMBLY OF LEAD PUMPING STATION

a. Assembly Requirements. Assembly of the lead pumping station requires one trailer-mounted pump assembly, and the tools, personnel, and components listed below. Remove the required components from the PUMPING STATIONS and 10-MILE SEGMENT crates. Inspect each part for damage and operability (para 2-5).

Tools	Used To
1-1/4 in. socket wrench and handle	Install 6 in. grooved pipe couplings
Pipe wrench	Install components with threaded fittings

Personnel

Two required for assembly of lead pumping station

Components

PUMPING STATIONS Crate

Qty	Size	Item
2	6 in.	Butterfly valve
1	6 in.	Check valve
1	6 in. x 20 ft	Discharge hose assembly
1	6 in.	Grooved pipe coupling
1	6 in.	Pressure relief valve and nipple

2-7. ASSEMBLY OF LEAD PUMPING STATION (CONT)

10-MILE SEGMENT Crate

Qty	Size	Item
1	6 in.	Coupling half, quick-disconnect, female
1	6 in.	Coupling pipe fitting

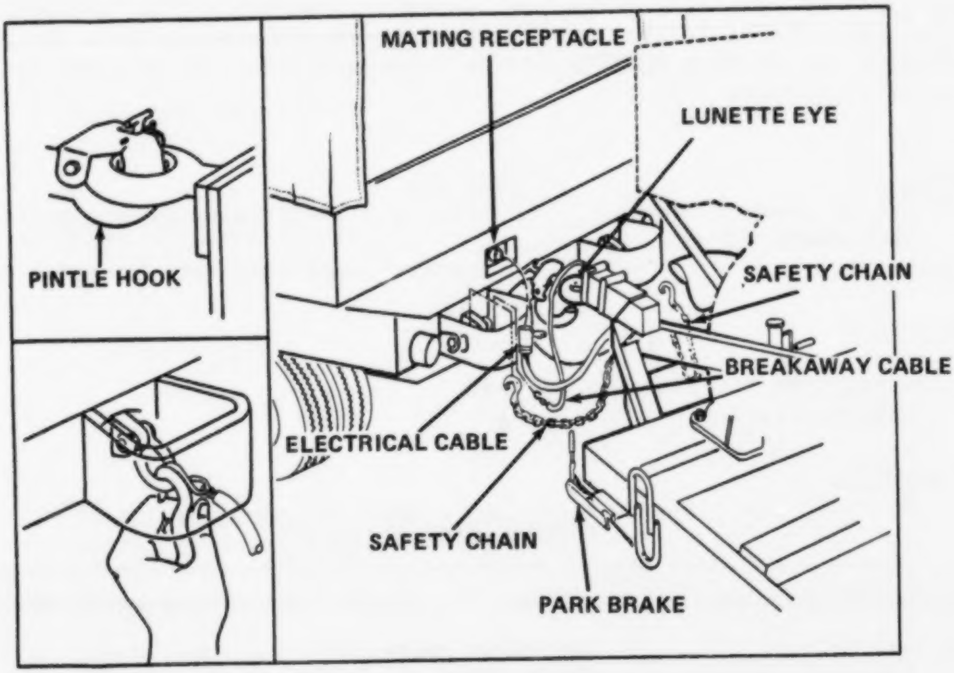
NOTE

Required number of suction hose assemblies depends on distance between water source and lead pumping station. Any unused hose assemblies can be used as spares.

Qty	Size	Item
12	6 in. x 10 ft	Suction hose assembly
1	6 in. x 4 in. x 4 in.	Y-connection reducer
1		

b. Assembly and Installation: Unit 609

1 Place park brake levers in lock position.

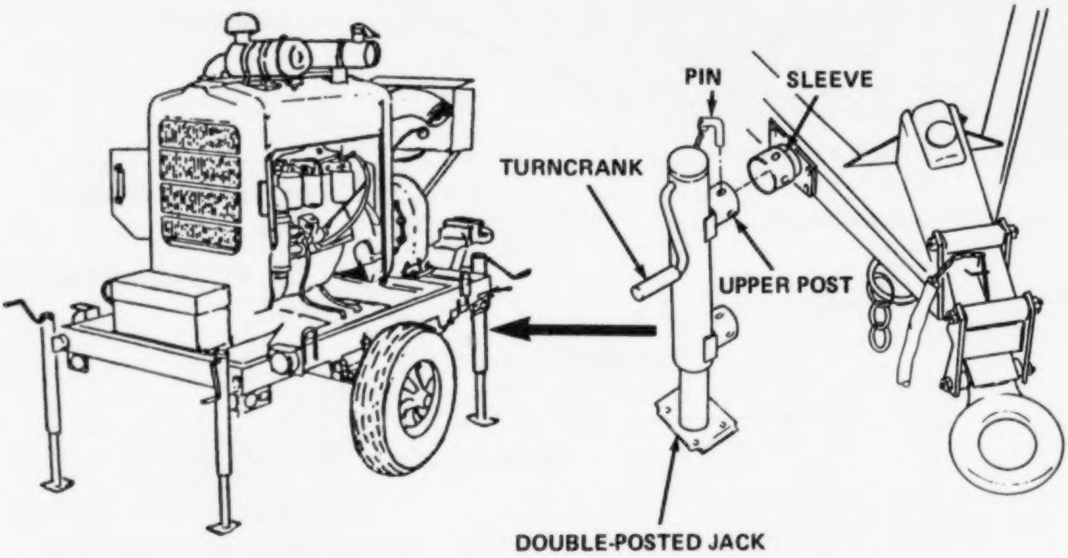

MATING RECEPTACLE
LUNETTE EYE
PINTLE HOOK
SAFETY CHAIN
BREAKAWAY CABLE
ELECTRICAL CABLE
SAFETY CHAIN
PARK BRAKE

2 To disconnect trailer-mounted pump assembly with double-posted jack from tow vehicle, proceed as follows:

2-7. ASSEMBLY OF LEAD PUMPING STATION (CONT)

(a) Disconnect safety chains and breakaway cable from tow vehicle.

(b) Disconnect electrical cable from mating receptacle on tow vehicle.



(c) Slip upper post of double-posted jack over sleeve on front left side of trailer.

(d) Aline holes in post and sleeve. Insert pin attached to jack through holes.

(e) Block trailer wheels. Use turncrank to lower jack. Jack trailer to position where lunette eye on trailer tongue can be released from pintle hook on tow vehicle.

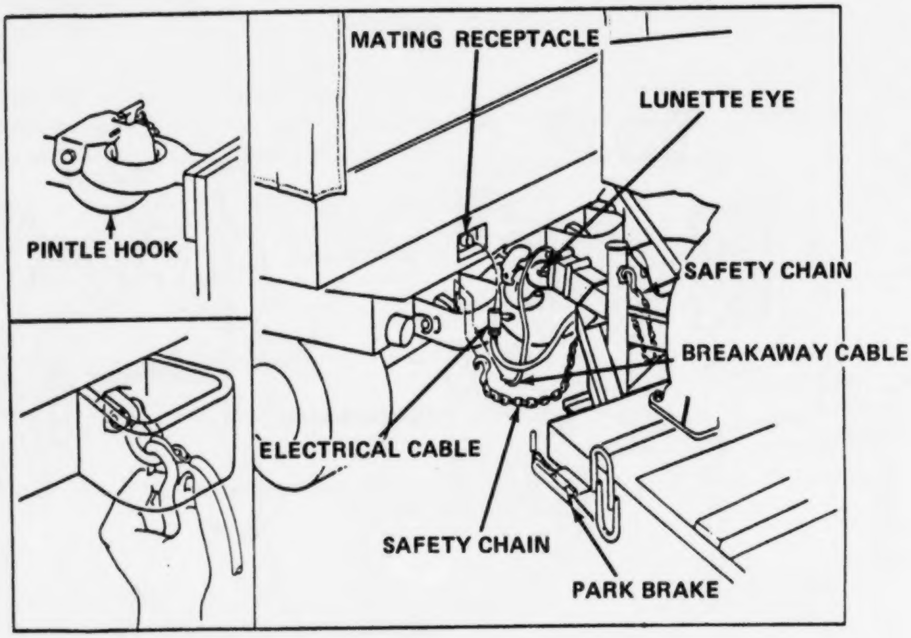
(f) Open pintle and slowly move tow vehicle forward until lunette eye is free of hook.

(g) Slip posts on two single-posted jacks over sleeves on rear of chassis.

(h) Aline holes in each post and sleeve. Insert pin attached to each jack through holes.

(i) Use turncranks to lower jacks until trailer-mounted pump assembly is secured in level position.

2-7. ASSEMBLY OF LEAD PUMPING STATION (CONT)


MATING RECEPTACLE
LUNETTE EYE
PINTLE HOOK
SAFETY CHAIN
BREAKAWAY CABLE
ELECTRICAL CABLE
SAFETY CHAIN
PARK BRAKE

3 To disconnect trailer-mounted pump assembly with tripod from tow vehicle, proceed as follows:

(a) Disconnect safety chains and breakaway cable from tow vehicle.

(b) Disconnect electrical cable from mating receptacle on tow vehicle.

(c) Block trailer wheels. Use turncrank to lower front tripod. Raise trailer to position where lunette eye on trailer tongue can be released from pintle hook on tow vehicle.

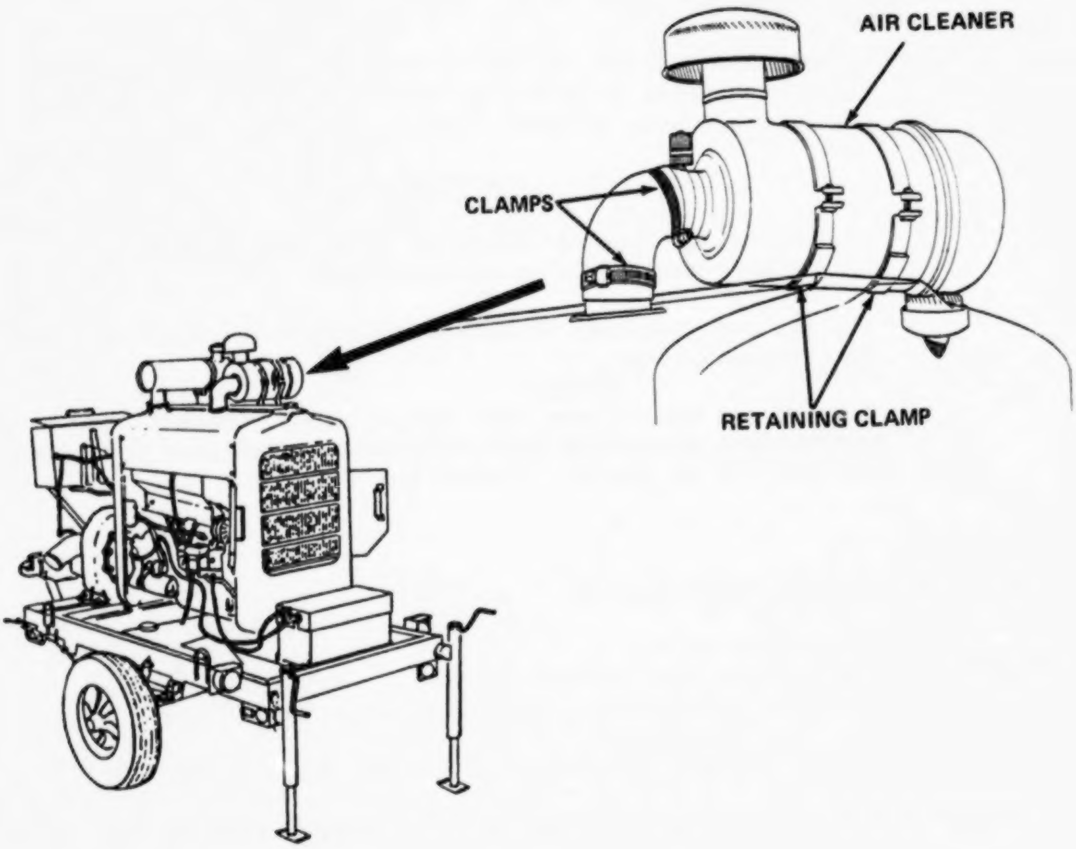
(d) Open pintle and slowly move tow vehicle forward until lunette eye is free of hook.

2-7. ASSEMBLY OF LEAD PUMPING STATION (CONT)

(e) Slip posts on two single-posted jacks over sleeves on rear of chassis.

(f) Aline holes in each post and sleeve. Insert pin attached to each jack through holes.

(g) Use turncranks to lower jacks until trailer-mounted pump assembly is secured in level position.



4 Locate air cleaner.

2-7. ASSEMBLY OF LEAD PUMPING STATION (CONT)

CAUTION

Before installing air cleaner, make sure that there are no obstructions in rubber elbow on canister body. If so, remove object.

NOTE

When installing retaining clamps on bracket, make sure that open end of each clamp is on same side of bracket.

5 Aline holes in flat portion of each air cleaner retaining clamp with holes in mounting bracket. Install two bolts, washers, and nuts on each clamp.

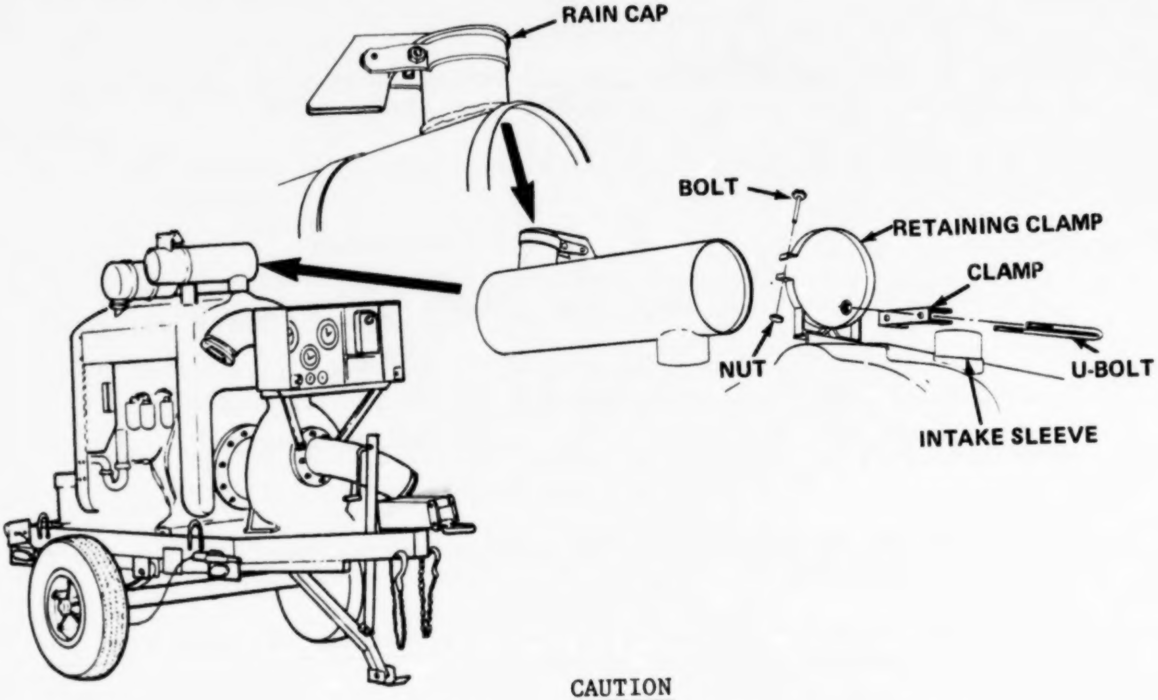
CAUTION

Do not overtighten bolts on retaining clamps. Damage may result to canister body.

6 Install canister body in retaining clamps. Install nut and bolt in each clamp.

7 Install two hose clamps over rubber hose. Connect hose to air cleaner and air intake pipe. Install and tighten hose clamps.

2-7. ASSEMBLY OF LEAD PUMPING STATION (CONT)



CAUTION

Before installing muffler, remove any obstructions in intake and exhaust sleeves on muffler body.

8 Locate muffler.

9 Aline holes in retaining clamp with holes in mounting bracket. Install two nuts and bolts.

10 Install intake sleeve on muffler over engine exhaust. Install muffler in retaining clamp.

11 Install bolt and nut on retaining clamp.

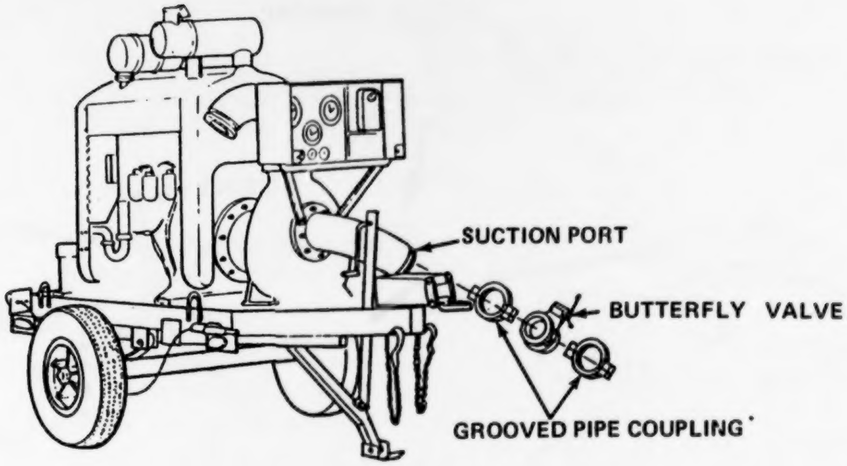
12 Install U-bolt, 4 in. clamp, and two nuts on intake sleeve.

CAUTION

When installing rain cap, ensure that cap arm is positioned to allow full limit of travel or exhaust may not be properly vented.

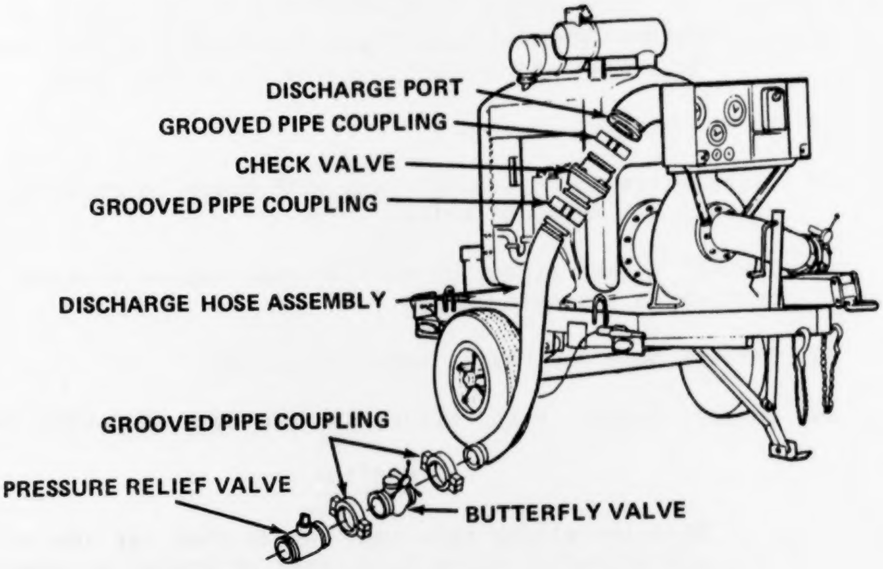
13 Install rain cap over exhaust sleeve. Make sure that top of cap is level with top of exhaust sleeve. Install bolt and nut.

2-7. ASSEMBLY OF LEAD PUMPING STATION (CONT)


SUCTION PORT
BUTTERFLY VALVE
GROOVED PIPE COUPLING

14 Remove plastic cap from suction port on pump. Retain cap for movement or storage.

15 Install 6 in. butterfly valve on suction port with 6 in. grooved pipe coupling (para 2-6).


DISCHARGE PORT
GROOVED PIPE COUPLING
CHECK VALVE
GROOVED PIPE COUPLING
DISCHARGE HOSE ASSEMBLY
GROOVED PIPE COUPLING
PRESSURE RELIEF VALVE
BUTTERFLY VALVE

16 Remove plastic cap from discharge port on pump. Retain cap for movement or storage.

2-7. ASSEMBLY OF LEAD PUMPING STATION (CONT)

CAUTION

To prevent damage to pump, make sure arrow on check valve points away from pump.

17 Install 6 in. check valve on pump discharge port with 6 in. grooved pipe coupling (para 2-6). Install valve with arrow pointing away from pump.

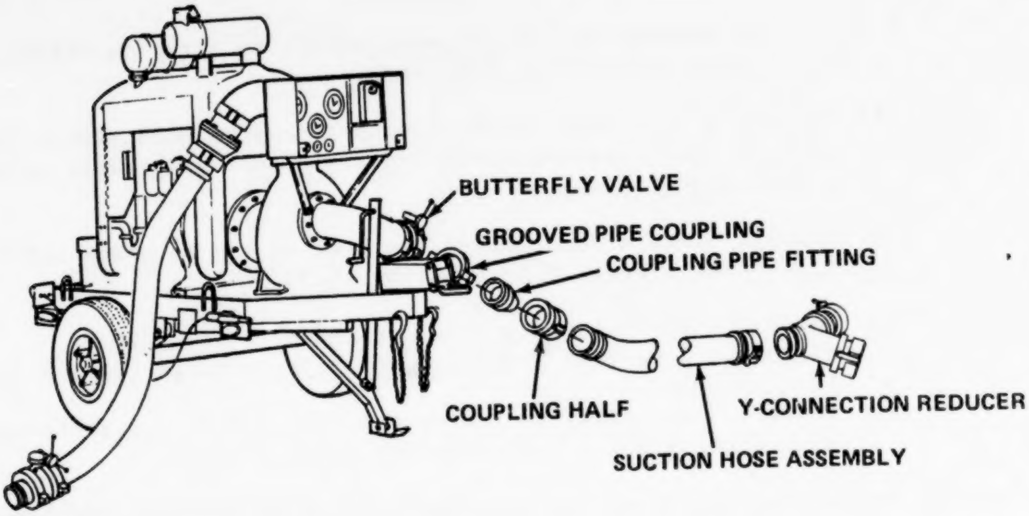
18 Install 6 in. x 20 ft discharge hose on end of check valve with 6 in. grooved pipe coupling (para 2-6).

19 Install 6 in. butterfly valve on end of 6 in. x 20 ft discharge hose with 6 in. grooved pipe coupling (para 2-6).

20 Install 6 in. pressure relief valve on end of butterfly valve with 6 in. grooved pipe coupling (para 2-6).

21 Set butterfly valves attached to suction port and discharge hose assembly to fully open position.

2-7. ASSEMBLY OF LEAD PUMPING STATION (CONT)


BUTTERFLY VALVE
GROOVED PIPE COUPLING
COUPLING PIPE FITTING
COUPLING HALF
Y-CONNECTION REDUCER
SUCTION HOSE ASSEMBLY

CAUTION

To prevent leakage, make sure coupling pipe fitting is tightly fitted to coupling half.

NOTE

Suction hose lengths, coupling pipe fitting, coupling half, and Y-connection reducer are packed in crate marked 10-MILE SEGMENT.

22 Wrap antiseize tape (item 14, appendix D) around threads on 6 in. coupling pipe fitting. Screw fitting into 6 in. coupling half.

23 Install coupling pipe fitting (with attached coupling half) on end of butterfly valve on suction port. Use 6 in. grooved pipe coupling unpacked from PUMP STATIONS crate (para 2-6).

24 Locate 6 in. x 10 ft lengths of rigid-walled, wire reinforced suction hose with quick-disconnect fittings.

25 Push cam arms on coupling half forward to open position.

2-7. ASSEMBLY OF LEAD PUMPING STATION (CONT)

CAUTION

- To prevent leakage, close both cam arms at the same time.
- Do not strike cam arms to close. Damage to couplings could result.

26 Connect suction hose to coupling half. Close cam arms.

27 Install additional 6 in. hose lengths until pump can be connected to water source.

28 Push cam arms on last suction hose forward to open position.

CAUTION

- To prevent leakage, close both cam arms at the same time.
- Do not strike cam arms to close. Damage to couplings could result.

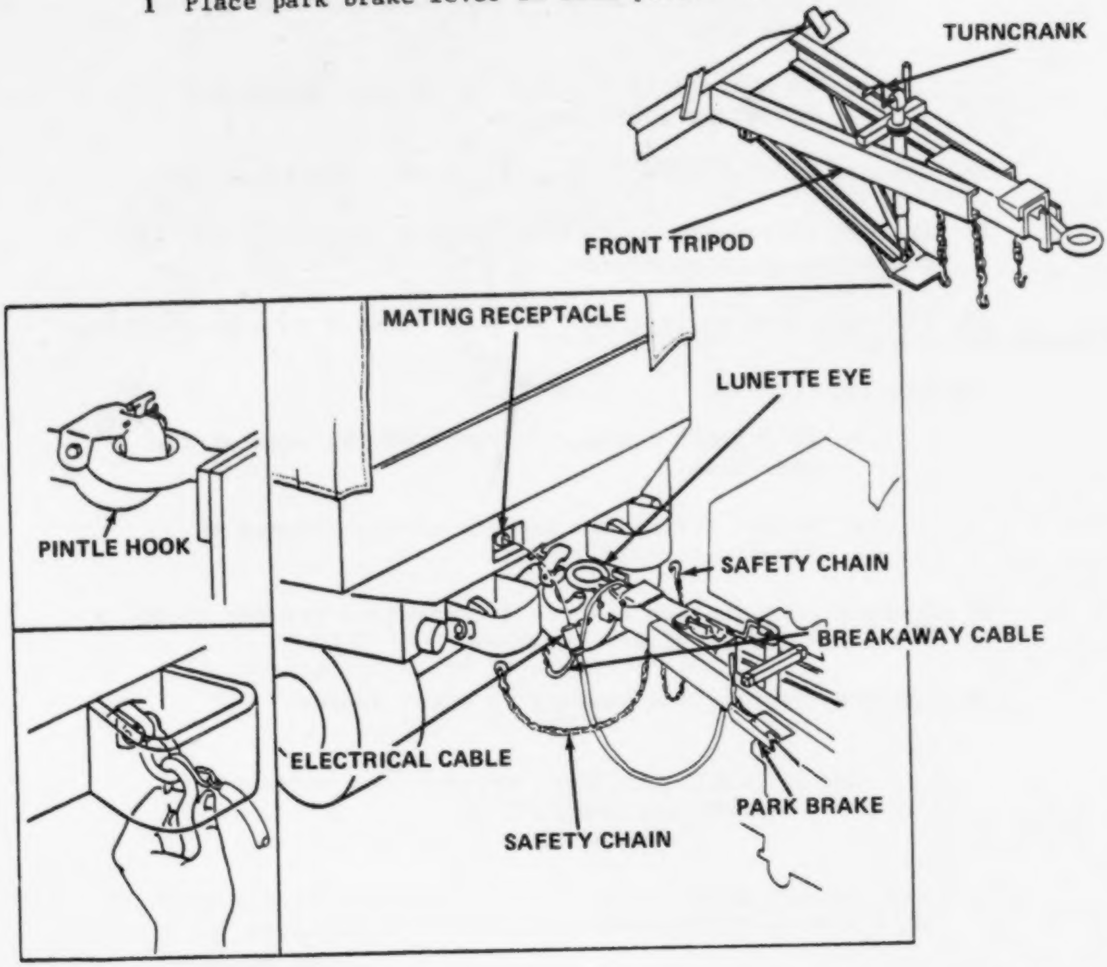
29 Connect last suction hose to Y-connection reducer (6 in. x 4 in. x 4 in.). Close cam arms.

30 Connect Y-connection reducer to water source.

2-7. ASSEMBLY OF LEAD PUMPING STATION (CONT)

c. Assembly and Installation: US636HCCD-1

1 Place park brake lever in lock position.


TURNCRANK
FRONT TRIPOD
MATING RECEPTACLE
LUNETTE EYE
PINTLE HOOK
SAFETY CHAIN
BREAKAWAY CABLE
ELECTRICAL CABLE
PARK BRAKE
SAFETY CHAIN

2 Using procedure that follows, disconnect trailer-mounted pump assembly from tow vehicle:

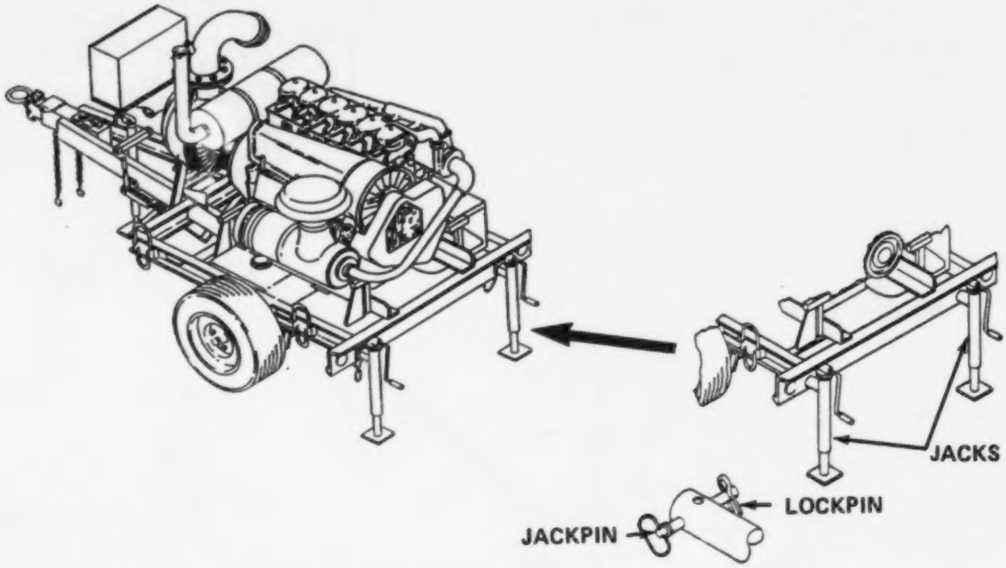
(a) Disconnect safety chains and breakaway cable from tow vehicle.

(b) Disconnect electrical cable from mating receptacle on tow vehicle.

(c) Block trailer wheels. Use turncrank to lower front tripod. Raise trailer to position where lunette eye on trailer tongue can be released from pintle hook on tow vehicle.

2-7. ASSEMBLY OF LEAD PUMPING STATION (CONT)

(d) Open pintle and slowly move tow vehicle forward until lunette eye is free of hook.



3 Remove lockpins from jackpins and set aside.

4 Remove two jackpins from holes in trailer support tubes and holes in trailer jacks.

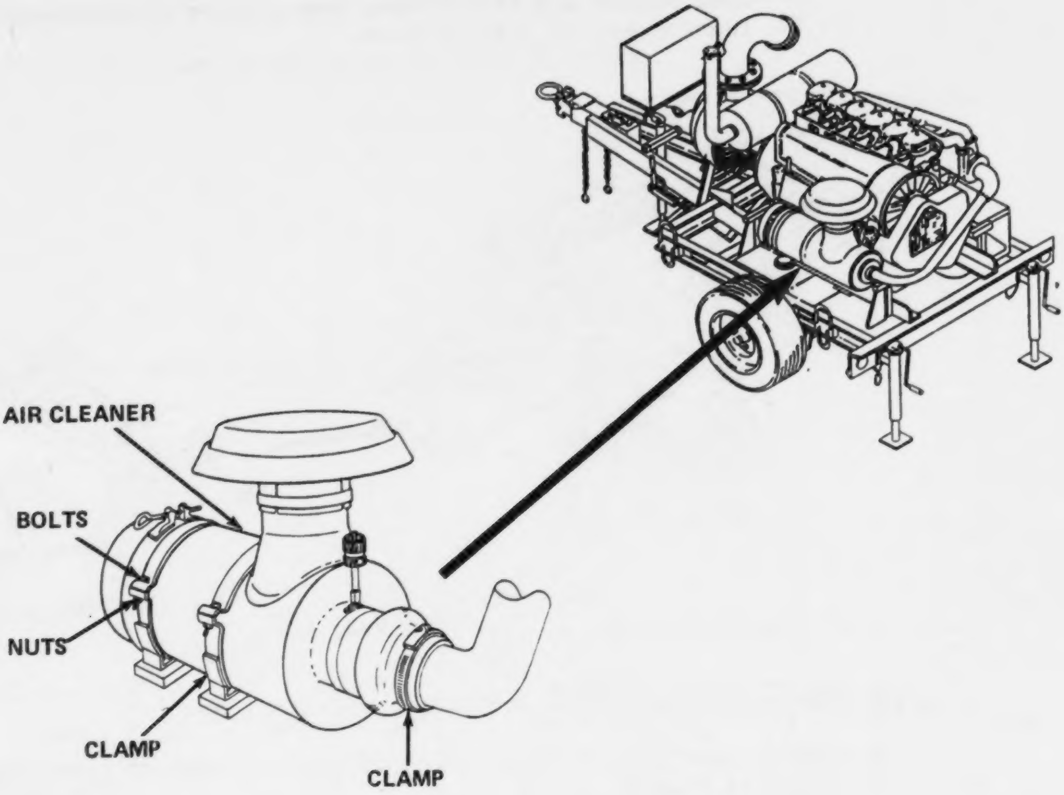
5 Swing two trailer jacks to vertical position.

6 Install two jackpins through holes in trailer support tubes and holes in trailer jacks.

7 Install two lockpins in jackpins.

8 Use turncranks to lower jacks until trailer-mounted pump assembly is level.

2-7. ASSEMBLY OF LEAD PUMPING STATION (CONT)



CAUTION

Before installing air cleaner, make sure that there are no obstructions in rubber hose on canister body. If so, remove object.

9 Locate air cleaner.

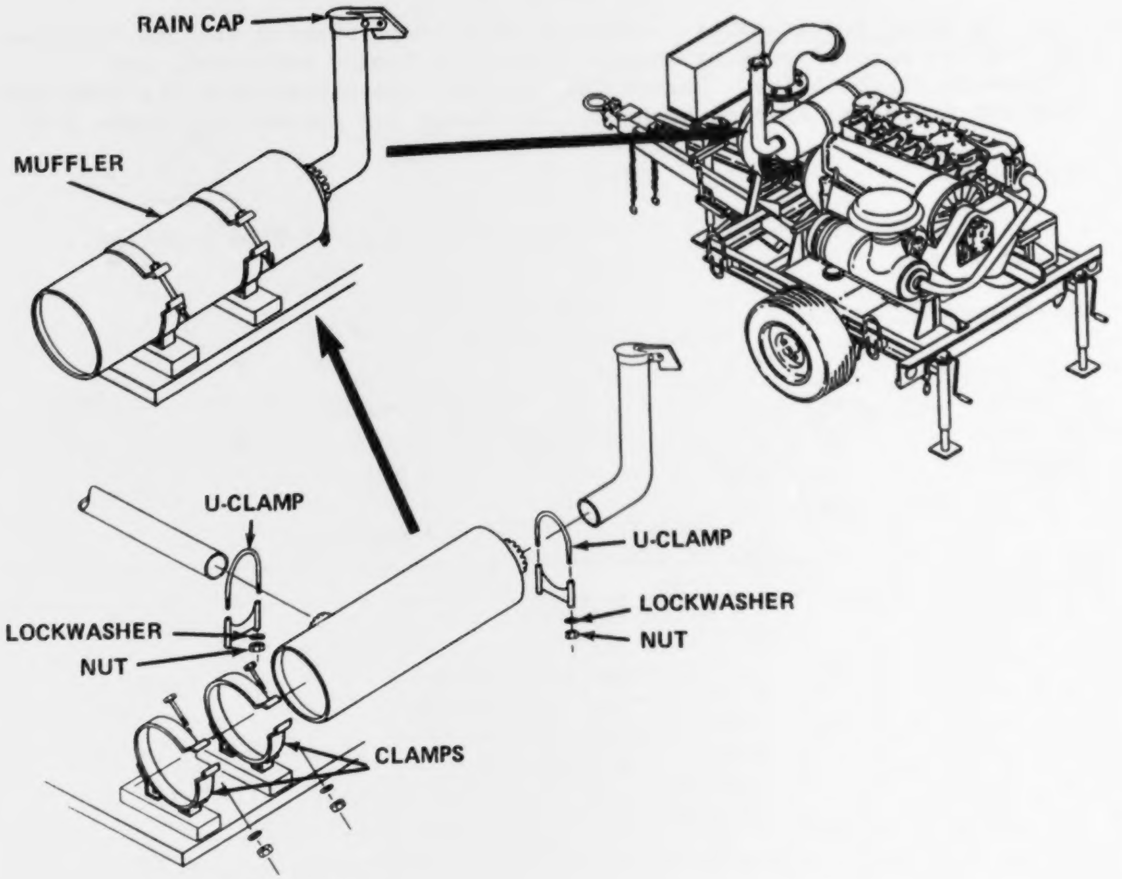
10 Install air cleaner clamps on brackets.

11 Install and tighten four clamp mounting bolts and washers.

12 Install air cleaner in clamps. Install two bolts and nuts on clamps.

13 Connect hose to air cleaner outlet. Tighten hose clamp.

2-7. ASSEMBLY OF LEAD PUMPING STATION (CONT)


RAIN CAP
MUFFLER
U-CLAMP
U-CLAMP
LOCKWASHER
LOCKWASHER
NUT
NUT
CLAMPS

14 Locate muffler.

15 Install rain cap on end of exhaust pipe.

16 Tighten nut on rain cap clamp bolt.

17 Install muffler in mounting clamps.

18 Insert manifold exhaust pipe in muffler inlet flange.

19 Install U-clamp over muffler inlet flange. Install clamp, two lockwashers, and two nuts.

20 Install U-clamp over muffler outlet flange. Install clamp, two lockwashers, and two nuts.

21 Perform steps 14 thru 30 of para 2-7b.

2-8. ASSEMBLY OF BOOST PUMPING STATIONS

a. Assembly Requirements. Assembly of a boost pumping station requires one trailer-mounted pumping assembly, and the tools, personnel, and components listed below. Remove the required components from the PUMPING STATIONS crate and inspect each one for damage and operability (para 2-5).

Tools	Used To
1-1/4 in. socket wrench and handle	Install 6 in. grooved pipe couplings

Personnel

Two required for assembly of boost pumping station

Components

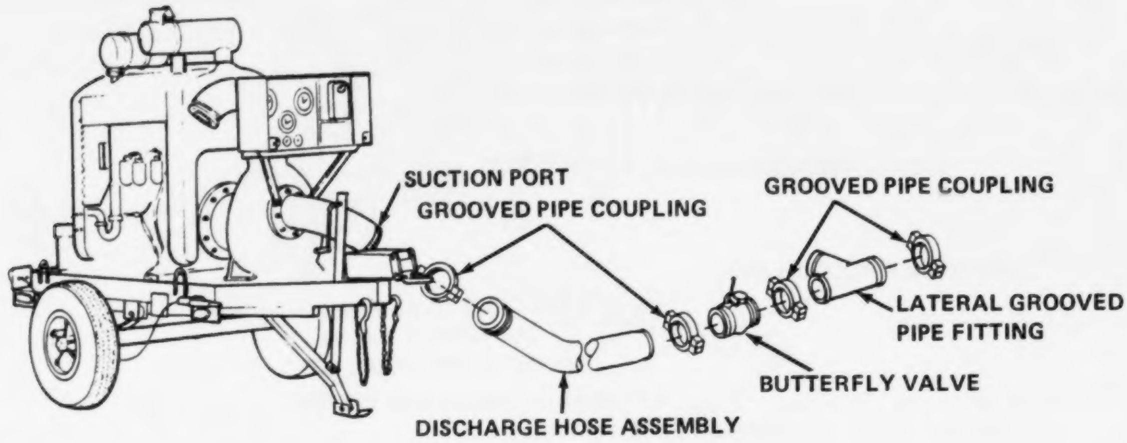
PUMPING STATIONS Crate

Qty	Size	Item
3	6 in.	Butterfly valve
1	6 in.	Check valve
1	6 in. x 10 ft	Discharge hose assembly
1	6 in. x 20 ft	Discharge hose assembly
1	6 in. x 75 ft	Discharge hose assembly
12	6 in.	Grooved pipe coupling
2	6 in.	Lateral grooved pipe fitting
1	6 in.	Pressure relief valve and nipple

b. Assembly and Installation: Unit 609

1 Perform steps 1 thru 13 of paragraph 2-7b.

2-8. ASSEMBLY OF BOOST PUMPING STATIONS (CONT)


SUCTION PORT
GROOVED PIPE COUPLING
GROOVED PIPE COUPLING
LATERAL GROOVED PIPE FITTING
BUTTERFLY VALVE
DISCHARGE HOSE ASSEMBLY

2 Remove plastic cap from suction port on pump. Retain cap for movement or storage.

CAUTION

After removing components from boxes, be sure to protect them from sand and grit.

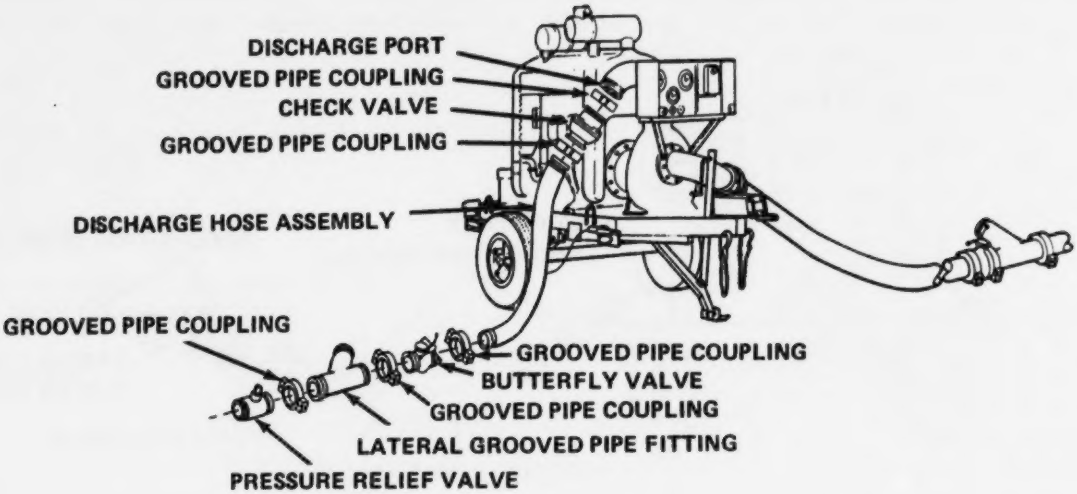
3 Attach 6 in. x 10 ft discharge hose to suction port on pump with 6 in. grooved pipe coupling (para 2-6).

4 Install 6 in. butterfly valve on end of 6 in. x 10 ft discharge hose with 6 in. grooved pipe coupling (para 2-6).

5 Install 6 in. lateral grooved pipe fitting on end of 6 in. butterfly valve with 6 in. grooved pipe coupling (para 2-6).

6 Install 6 in. grooved pipe coupling on end of lateral grooved pipe fitting (para 2-6).

2-8. ASSEMBLY OF BOOST PUMPING STATIONS (CONT)


DISCHARGE PORT
GROOVED PIPE COUPLING
CHECK VALVE
GROOVED PIPE COUPLING
DISCHARGE HOSE ASSEMBLY
GROOVED PIPE COUPLING
GROOVED PIPE COUPLING
BUTTERFLY VALVE
GROOVED PIPE COUPLING
LATERAL GROOVED PIPE FITTING
PRESSURE RELIEF VALVE

7 Remove plastic cap from discharge port on pump. Retain cap for movement or storage.

CAUTION

To prevent damage to pump, make sure arrow on check valve points away from pump.

8 Install 6 in. check valve on pump discharge port with 6 in. grooved pipe coupling (para 2-6). Install valve with arrow pointing away from pump.

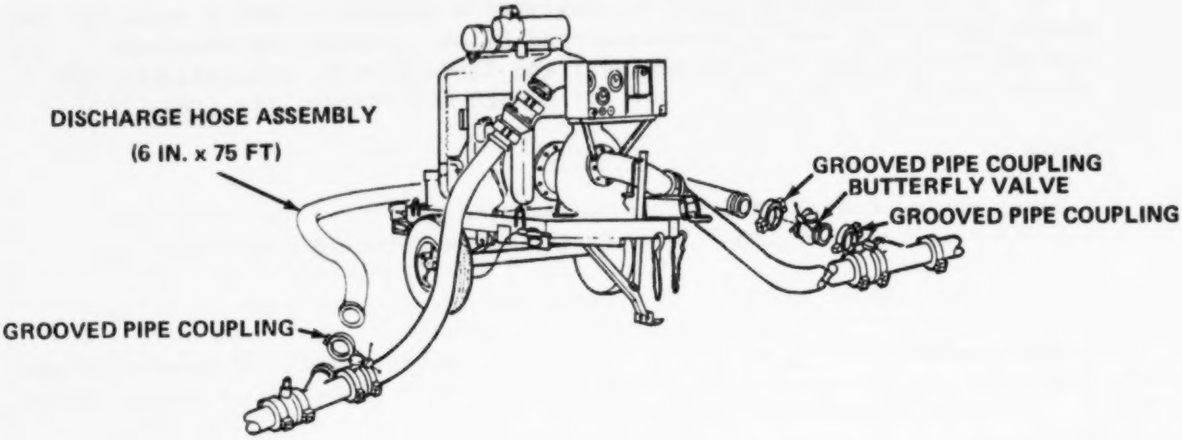
9 Install 6 in. x 20 ft discharge hose on end of check valve with 6 in. grooved pipe coupling (para 2-6).

10 Install 6 in. butterfly valve on end of 6 in. x 20 ft discharge hose with 6 in. grooved pipe coupling (para 2-6).

11 Install 6 in. lateral grooved pipe fitting on end of 6 in. butterfly valve with 6 in. grooved pipe coupling (para 2-6).

12 Install 6 in. pressure relief valve on end of lateral grooved pipe fitting with 6 in. grooved pipe coupling (para 2-6).

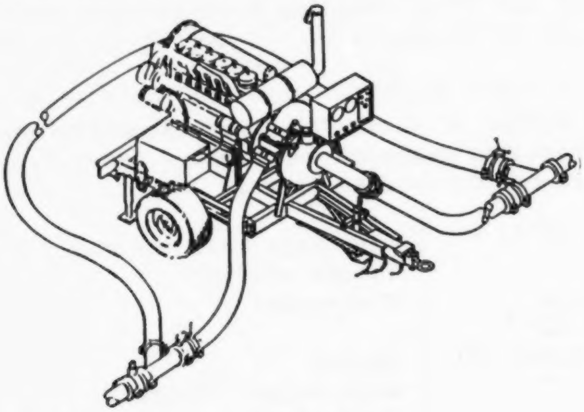
2-8. ASSEMBLY OF BOOST PUMPING STATIONS (CONT)


DISCHARGE HOSE ASSEMBLY
(6 IN. x 75 FT)
GROOVED PIPE COUPLING
BUTTERFLY VALVE
GROOVED PIPE COUPLING
GROOVED PIPE COUPLING

13 Install 6 in. butterfly valve on end of lateral grooved pipe fitting (attached to 6 in. x 10 ft discharge hose assembly) with 6 in. grooved pipe coupling (para 2-6).

15 Install 6 in. x 75 ft discharge hose on end of butterfly valve with 6 in. grooved pipe coupling (para 2-6).

16 Install 6 in. x 75 ft discharge hose on end of lateral grooved pipe fitting (attached to 6 in. x 20 ft discharge hose assembly) with 6 in. grooved pipe coupling (para 2-6).



c. Assembly and Installation: US636HCCD-1

1 Perform steps 1 thru 20 of paragraph 2-7c.

2 Perform steps 2 thru 16 of paragraph 2-8b.

2-9. ASSEMBLY OF STORAGE ASSEMBLIES

a. Assembly Requirements. Assembly of a storage assembly requires the tools, personnel, and components listed below. Remove the required components from the STORAGE ASSEMBLY and TANK, FABRIC, COLLAPSIBLE, 20K GALLON crates. Inspect each one for damage and operability (para 2-5).

Tools	Used To
Earth moving equipment	Construct dike
1-1/4 in. socket wrench and handle	Install 6 in. grooved pipe couplings
1-1/16 in. socket wrench and handle	Install 4 in. grooved pipe couplings
Pipe wrench	Install components with threaded fittings
Shovel	Dig sumps under filler/discharge fittings

Personnel

Two required for assembly of storage assembly

Components

STORAGE ASSEMBLY Crate

Qty	Size	Item
16	UNC-2A x 3.25 in.	Bolt
1	4 in.	Coupling half, female, quick-disconnect
1	4 in.	Coupling half, male, quick-disconnect
1	4 in.	Coupling pipe fitting

NOTE

Required number of discharge hose assemblies depends on distance between hoseline segement and storage assembly. Any unused hose assemblies can be used as spares.

4	4 in. x 10 ft	Discharge hose assembly, quick-disconnect
1	4 in.	Flange adapter
32	0.046 ID x 0.812 OD	Flatwasher
2	4 in., Class 150	Gasket
1	4 in.	Gate valve, flanged
1	4 in.	Grooved pipe coupling
1	6 in.	Grooved pipe coupling
16	0.375 16 UNC-2B	Hexnut
16	0.375 in.	Lockwasher
1	6 in. x 6 in. x 4 in.	Reducing tee

2-9. ASSEMBLY OF STORAGE ASSEMBLIES (CONT)

TANK, FABRIC, COLLAPSIBLE, 20K GALLON Crate

Qty	Size	Item
1	1/2 in.	Gate valve

CAUTION

To prevent nails, rocks, or other sharp objects from damaging storage tank, be careful when removing it from crate. Tip crate slowly. Roll storage tank out gently.

1	20,000 gal	Storage tank, collapsible
1	4 in. x 90°	Filler/discharge elbow, male-to-female, quick-disconnect
1	4 in. x 90°	Filler/discharge elbow, female-to-female, quick-disconnect
1	3/4 in.	Suction hose
1		Vent assembly, quick-disconnect

b. Assembly and Installation

CAUTION

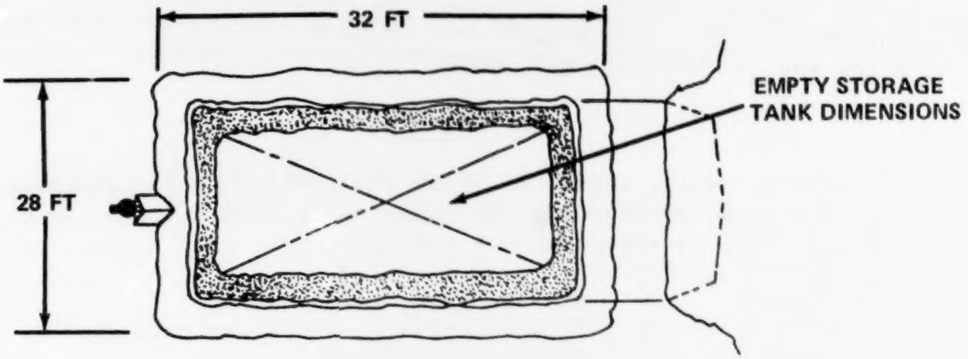
To prevent damage to storage assembly, DO NOT choose site subject to flooding or high water.

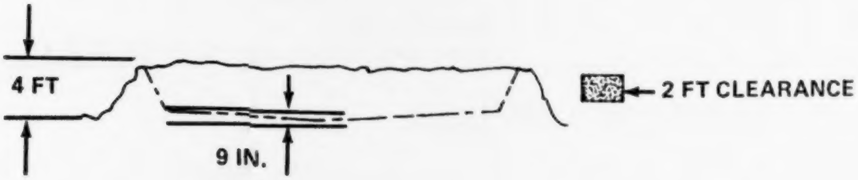
NOTE

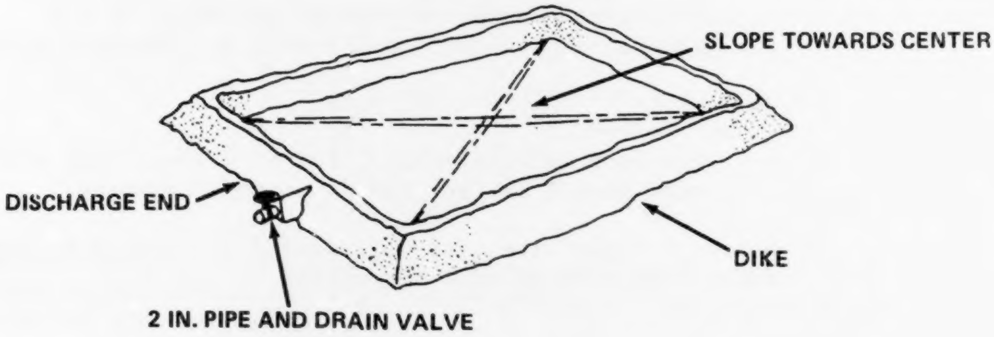
For best tank operation, the site should not slope more than 3 in. per 100 ft in any direction.

1 Select a level site that will extend at least 2 ft beyond the empty flat storage tank dimensions.

2-9. ASSEMBLY OF STORAGE ASSEMBLIES (CONT)


32 FT
28 FT
EMPTY STORAGE TANK DIMENSIONS


4 FT
9 IN.
▨ 2 FT CLEARANCE


SLOPE TOWARDS CENTER
DISCHARGE END
DIKE
2 IN. PIPE AND DRAIN VALVE

2 Clean and level an area 28 ft x 32 ft.

3 Inspect area closely. Remove all sharp objects that might puncture or scrape tank.

NOTE

Center should be no more than 9 in. below ground level.

4 Slope all four sides of leveled area toward center.

2-9. ASSEMBLY OF STORAGE ASSEMBLIES (CONT)

NOTE

Dike should be able to contain at least 20,000 gal. of water.

5 Erect a 4 ft high earth dike around site.

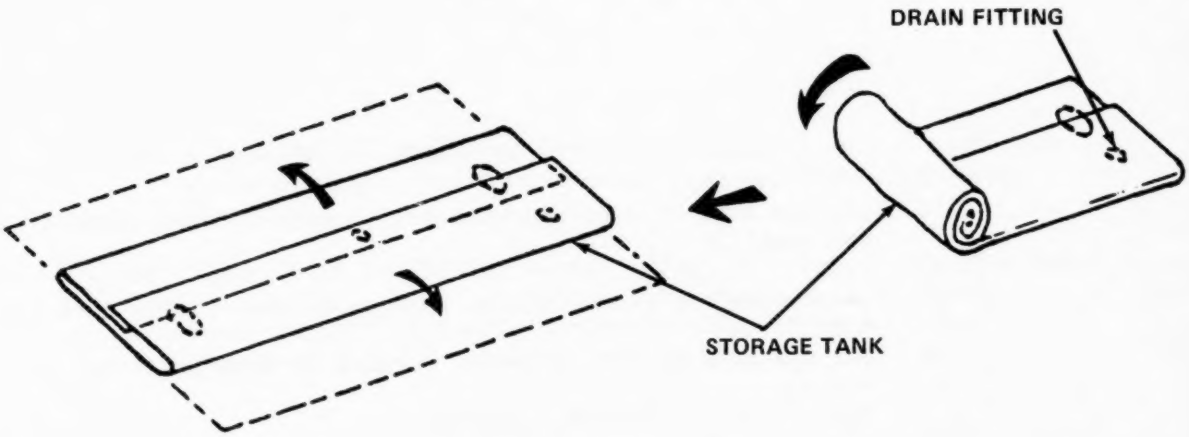
6 Designate end of dike as "discharge end." Discharge end should face away from distribution point installation site, and if possible, away from 10-mile hoseline segment.

NOTE

Make sure valve on discharge pipe is closed after installation. Failure to do so would allow water to drain from dike should tank rupture. Open valve only to drain water from dike area.

7 Place 2 in. pipe with gate valve through bottom of discharge end of dike.

8 Secure area, if necessary, by fencing or other means.



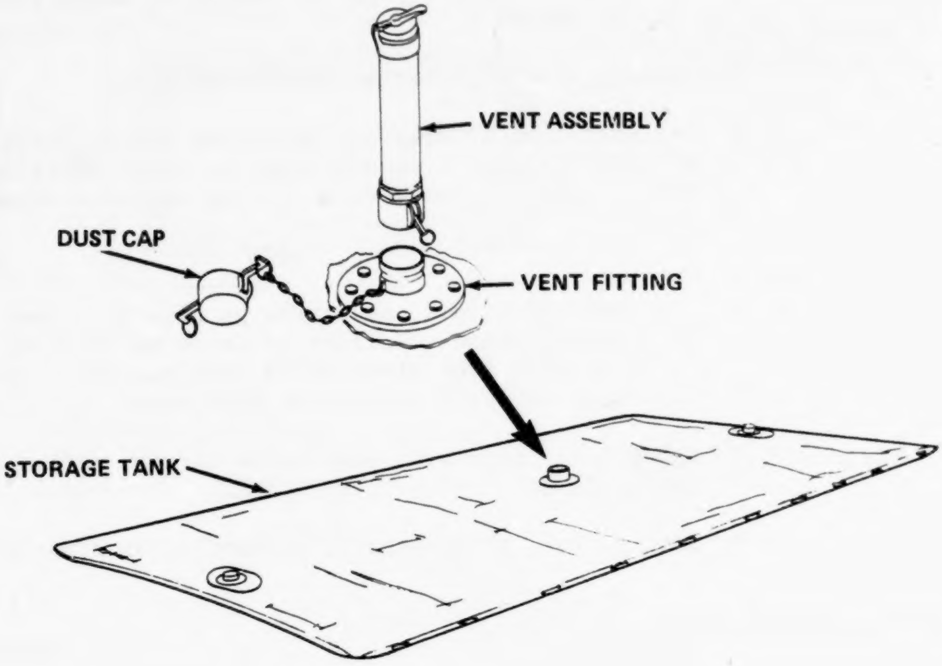
CAUTION

To prevent damage to storage tank, DO NOT walk on tank unless you must. DO NOT drop sharp objects on tank.

9 Unroll storage tank and unfold sides. Drain end of tank will unroll first. Use webbing handles to position tank.

2-9. ASSEMBLY OF STORAGE ASSEMBLIES (CONT)

10 Dig 3 ft x 3 ft x 2 in. sump under filler/discharge fittings.



11 Push cam arms on dust cap attached to vent fitting forward to open position.

12 Remove dust cap from fitting. Make sure chain holds dust cap.

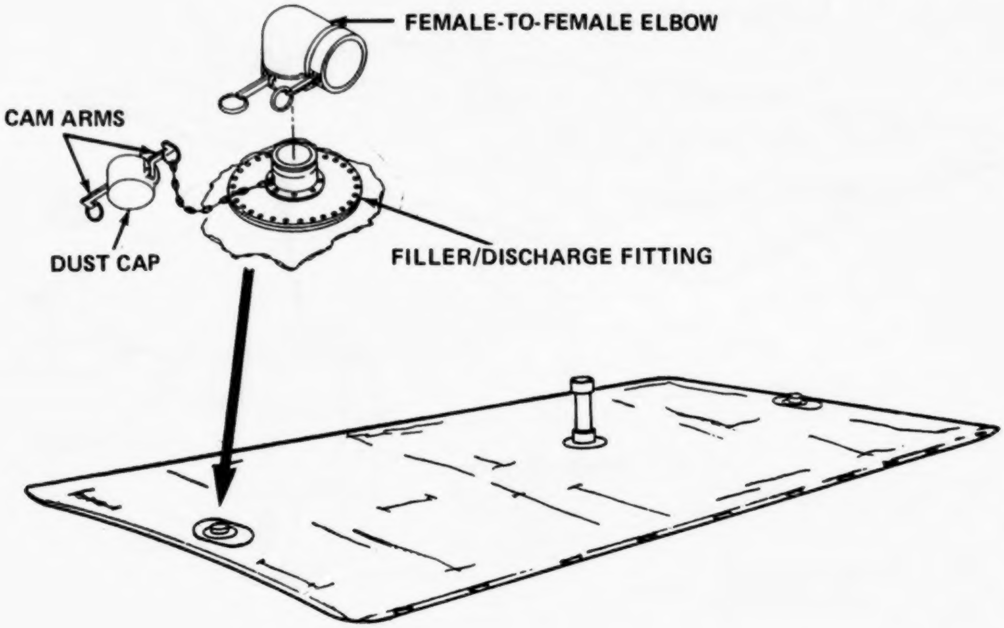
13 Push cam arms on vent assembly forward to open position.

CAUTION

- To prevent leakage, close both cam arms at the same time.
- Do not strike cam arms to close. Damage to couplings could result.

14 Connect vent assembly to fitting on tank. Close cam arms.

2-9. ASSEMBLY OF STORAGE ASSEMBLIES (CONT)


FEMALE-TO-FEMALE ELBOW
CAM ARMS
DUST CAP
FILLER/DISCHARGE FITTING

15 Locate filler/discharge fitting on opposite end of tank from drain fitting. Push cam arms on dust cap forward to open position.

16 Remove dust cap from fitting. Make sure chain holds dust cap.

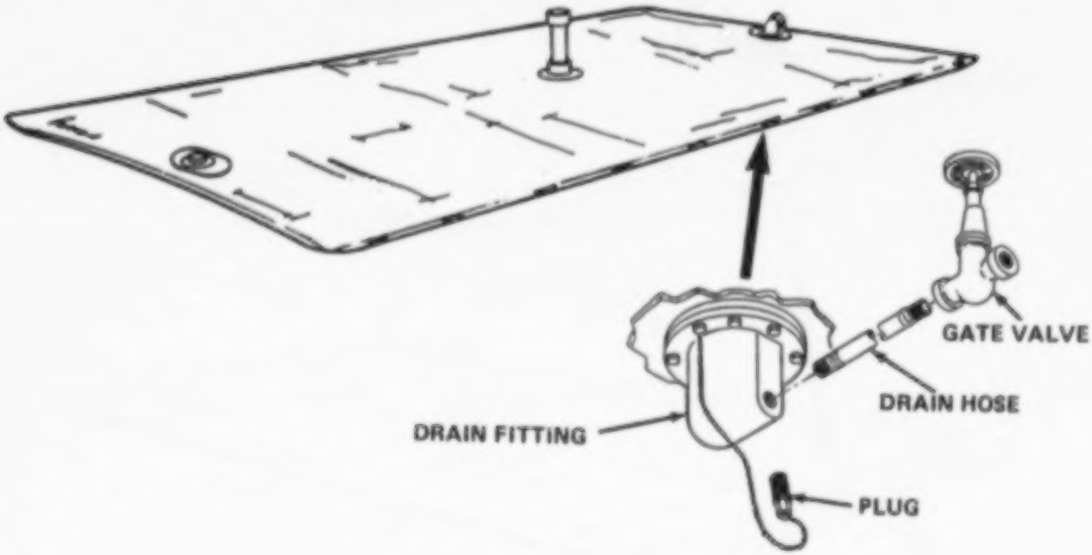
17 Push cam arms on female-to-female elbow forward to open position.

CAUTION

- Do not close cam arms or misalinement of parts will result.
- Do not strike cam arms to close. Damage to couplings could result.

18 Connect elbow to fitting on tank. Close cam arms. Leave cam arms on other end of elbow open.

2-9. ASSEMBLY OF STORAGE ASSEMBLIES (CONT)



19 Locate drain fitting on bottom of storage tank.

20 Unscrew plug from drain fitting. Make sure chain holds plug to fitting.

21 Wrap antiseize tape (item 14, appendix D) around threads on 3/4 in. x 8 ft drain hose.

CAUTION

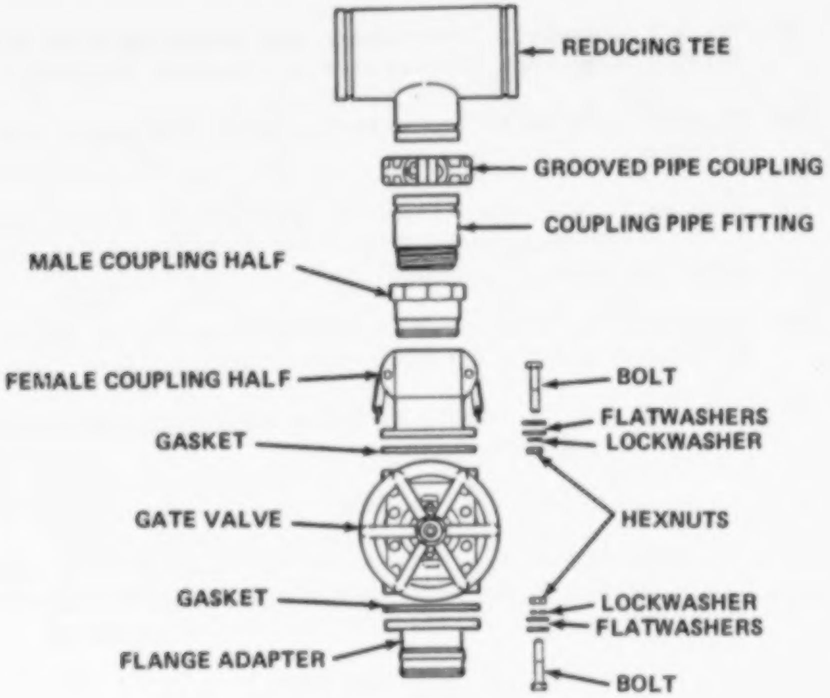
Make sure hose connections are tight to prevent leakage.

22 Connect drain hose to opening in drain fitting.

23 Connect other end of drain hose to threaded fitting on 1/2 in. gate valve.

24 Close gate valve on drain hose assembly.

2-9. ASSEMBLY OF STORAGE ASSEMBLIES (CONT)


REDUCING TEE
GROOVED PIPE COUPLING
COUPLING PIPE FITTING
MALE COUPLING HALF
FEMALE COUPLING HALF
BOLT
FLATWASHERS
LOCKWASHER
GASKET
GATE VALVE
HEXNUTS
GASKET
LOCKWASHER
FLATWASHERS
FLANGE ADAPTER
BOLT

CAUTION

After removing components from boxes, be sure to protect them from sand and grit.

25 Place gasket on 4 in. flange adapter. Place 4 in. gate valve on flange adapter. Aline holes in each part of assembly.

26 Place flatwashers on eight bolts. Insert bolts through openings in adapter, gasket, and gate valve.

27 Place flatwasher, lockwasher, and hexnut on each end of eight bolts. Make sure lockwashers are against hexnuts.

28 Tighten nuts until lockwashers engage and parts are firmly together.

29 Place gasket on 4 in. female coupling half. Place 4 in. gate valve on flange adapter. Aline holes in each part of assembly.

2-9. ASSEMBLY OF STORAGE ASSEMBLIES (CONT)

30 Place flatwashers on eight bolts. Insert bolts through openings in coupling half, gasket, and gate valve.

31 Place flatwasher, lockwasher, and hexnut on each end of eight bolts. Make sure lockwashers are against hexnuts.

32 Tighten nuts until lockwashers engage and parts are firmly together.

33 Wrap antiseize tape (item 14, appendix D) around threads of 4 in. coupling pipe fitting. Screw pipe fitting into male coupling half.

34 Connect 6 in. x 6 in. x 4 in. reducing tee to coupling pipe fitting with 4 in. grooved pipe coupling (para 2-6).

35 Push cam arms on female coupling half (attached to gate valve) forward to open position.

NOTE

When installing gate valve on reducing tee, make sure two 6 in. ends on tee are at right angles to stem on gate valve.

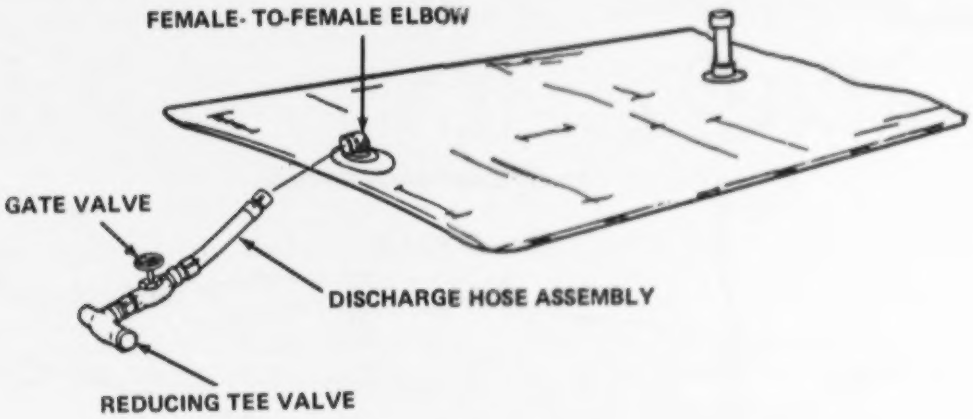
CAUTION

- To prevent leakage, close both cam arms at the same time.
- Do not strike cam arms to close. Damage to couplings could result.

36 Connect female coupling half on gate valve to male coupling half. Close cam arms.

37 Place reducing tee/gate valve assembly at point where junction with 10-mile hoseline segment is expected.

2-9. ASSEMBLY OF STORAGE ASSEMBLIES (CONT)


FEMALE-TO-FEMALE ELBOW
GATE VALVE
DISCHARGE HOSE ASSEMBLY
REDUCING TEE VALVE

38 Connect 4 in. x 10 ft discharge hose assembly to female-to-female elbow on tank. Close cam arms.

39 Connect additional hose lengths as necessary to reach reducing tee/gate valve assembly.

CAUTION

- To prevent leakage, close both cam arms at the same time.
- Do not strike cam arms to close. Damage to couplings could result.

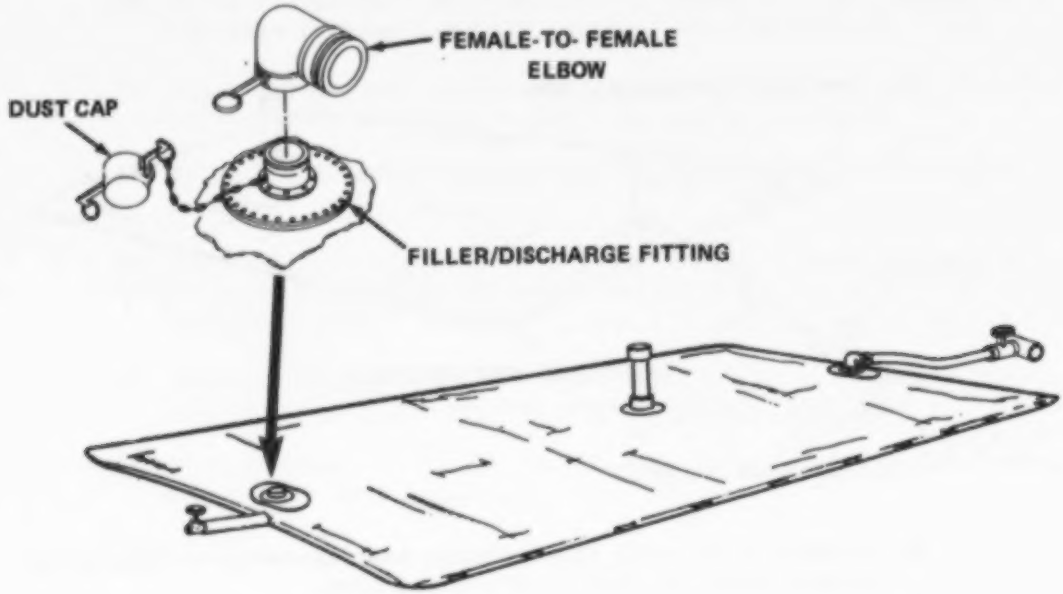
40 Connect female coupling on the last hose length with flange adapter attached to 4 in. gate valve. Close cam arms.

NOTE

Hose-laying crew should provide enough slack in hoseline to allow for connection of reducing tee/gate valve assembly.

41 Move reducing tee/gate valve assembly to a location that will be out of the way of hose-laying crews.

2-9. ASSEMBLY OF STORAGE ASSEMBLIES (CONT)



NOTE

Perform steps 42 thru 45 only if tank is used with distribution point.

42 Locate second filler/discharge fitting on storage tank (above drain valve). Push cam arms on dust cap forward to open position.

43 Remove dust cap from fitting. Make sure chain holds dust cap to fitting.

44 Push cam arms of female coupling on female-to-male elbow forward to open position.

CAUTION

- To prevent leakage, close both cam arms at the same time
- Do not strike cam arms to close. Damage to couplings could result.

45 Connect female coupling on elbow with fitting on tank. Close cam arms.

2-10. ASSEMBLY OF DISTRIBUTION POINTS

a. Assembly Requirements. Assembly of a distribution point requires the tools, personnel, and components listed below. Remove the required components from the DISTRIBUTION POINT and PUMP, CENTRIFUGAL, 125 GPM crates. Inspect each part for damage and operability (para 2-5).

Tools	Used To
Pipe wrench	Install components with threaded fittings

Personnel

Two required for assembly of distribution point

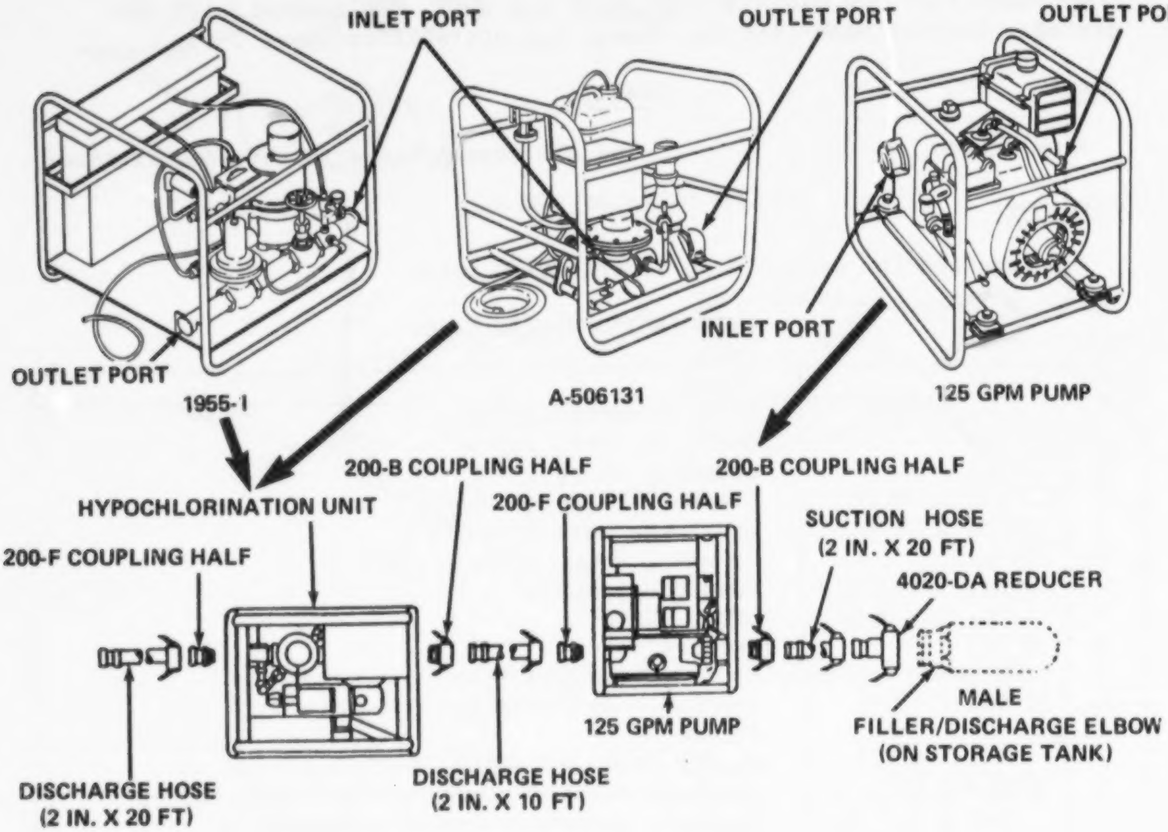
DISTRIBUTION POINT Crate

Qty	Size	Item
1		Color comparator kit
4	2 in.	Coupling half, 200-B
4	2 in.	Coupling half, 200-F
1	2 in. x 10 ft	Discharge hose assembly
7	2 in. x 20 ft	Discharge hose assembly
2	36 gal	Drinking water storage bag
4	2 in.	Dust plug, 200-DP
2	2 in. x 2 in.	Elbow valve
2	2 in.	Gate valve
1	100 gpm	Hypochlorination unit
1	2 in. x 20 ft	Suction hose assembly
2		Nozzle
2		Nozzle stand assembly
2	2 in. x 1.5 in.	Reducer, quick-disconnect, threaded, 2015-B
2	2 in. x 1.5 in.	Reducer, quick-disconnect, 2015-DA
1	2 in. x 3 in.	Reducer, quick-disconnect, 2030-DA-AL
1	2 in. x 4 in.	Reducer, quick-disconnect, 2040-DA-AL
1	4 in. x 2 in.	Reducer, quick-disconnect, 4020-DA
3	2 in. x 2 in. x 2 in.	Y-connection, quick-disconnect

PUMP, CENTRIFUGAL, 125 GPM Crate

Qty	Size	Item
1		Pump, centrifugal, 125 gpm

2-10. ASSEMBLY OF DISTRIBUTION POINTS (CONT)


INLET PORT
OUTLET PORT
OUTLET PORT
INLET PORT
OUTLET PORT
1955-1
A-506131
125 GPM PUMP
200-B COUPLING HALF
200-B COUPLING HALF
HYPOCHLORINATION UNIT
200-F COUPLING HALF
SUCTION HOSE (2 IN. X 20 FT)
200-F COUPLING HALF
4020-DA REDUCER
MALE FILLER/DISCHARGE ELBOW (ON STORAGE TANK)
125 GPM PUMP
DISCHARGE HOSE (2 IN. X 20 FT)
DISCHARGE HOSE (2 IN. X 10 FT)

b. Assembly and Installation

1 Locate male filler/discharge elbow on storage tank.

CAUTION

After removing components from boxes, protect components from sand and grit.

2 Push cam arms on female end of 4020-DA reducer forward to open position.

2-10. ASSEMBLY OF DISTRIBUTION POINTS (CONT)

CAUTION

- To prevent leakage, close both cam arms at the same time.
- Do not strike cam arms to close. Damage to couplings could result.

3 Connect female end of reducer to male fitting on elbow. Close cam arms.

4 Push cam arms on 2 in. x 20 ft rigid-walled suction hose forward to open position.

CAUTION

- To prevent leakage, close both cam arms at the same time.
- Do not strike cam arms to close. Damage to couplings could result.

5 Connect hose to reducer attached to storage tank. Close cam arms.

6 Locate suction and discharge ports on 125 gpm pump.

7 Wrap antiseize tape (item 14, appendix D) around threads on 200-B coupling half. Screw coupling half into suction port of 125 gpm pump.

8 Push cam arms on coupling half forward to open position.

CAUTION

- To prevent leakage, close both cam arms at the same time.
- Do not strike cam arms to close. Damage to couplings could result.

9 Connect hose assembly to 200-B coupling half on pump. Close cam arms.

10 Wrap antiseize tape (item 14, appendix D) around threads on 200-F coupling half. Screw coupling half into discharge port of 125 gpm pump.

2-10. ASSEMBLY OF DISTRIBUTION POINTS (CONT)

CAUTION

- To prevent leakage, close both cam arms at the same time.
- Do not strike cam arms to close. Damage to couplings could result.

11 Connect 2 in. x 10 ft discharge hose to 200-F coupling half on pump. Close cam arms.

12 Locate inlet and outlet ports on hypochlorination unit. Unscrew plastic dust caps from both ports. Store caps for later use.

13 Wrap antiseize tape (item 14, appendix D) around threads on 200-B coupling half. Screw coupling half into inlet port on hypochlorination unit.

14 Push cam arms on 200-B coupling half forward to open position.

CAUTION

- To prevent leakage, close both cam arms at the same time
- Do not strike cam arms to close. Damage to couplings could result.

15 Connect hose to 200-B coupling half attached to hypochlorination unit. Close cam arms.

16 Wrap antiseize tape (item 14, appendix D) around threads on 200-F coupling half. Screw coupling half into outlet port on hypochlorination unit.

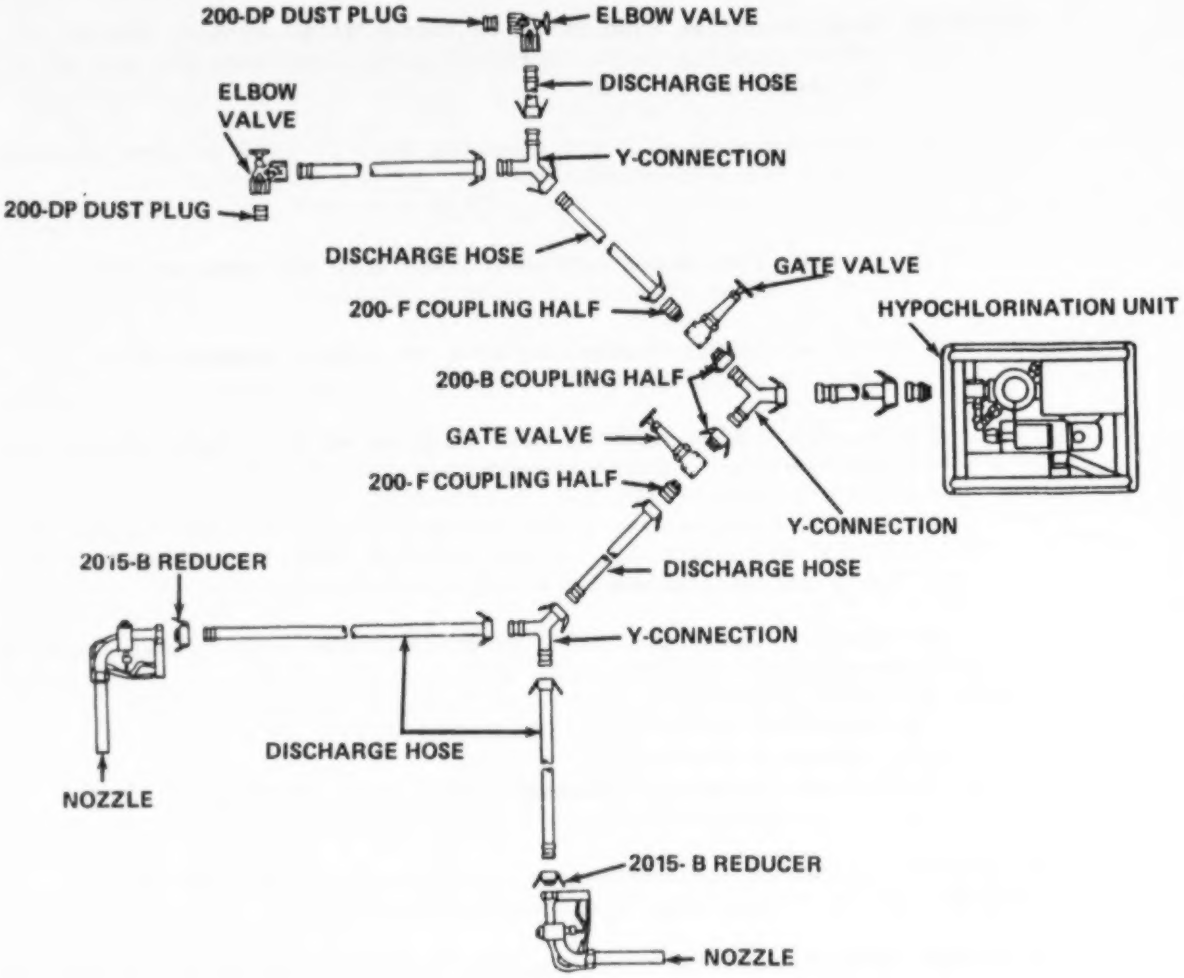
17 Push cam arms on 2 in. x 20 ft discharge hose forward to open position.

CAUTION

- To prevent leakage, close both cam arms at the same time
- Do not strike cam arms to close. Damage to couplings could result.

18 Connect hose to 200-F coupling half on hypochlorination unit. Close cam arms.

2-10. ASSEMBLY OF DISTRIBUTION POINTS (CONT)


200-DP DUST PLUG
ELBOW VALVE
DISCHARGE HOSE
ELBOW VALVE
Y-CONNECTION
200-DP DUST PLUG
DISCHARGE HOSE
GATE VALVE
200- F COUPLING HALF
HYPOCHLORINATION UNIT
200-B COUPLING HALF
GATE VALVE
200- F COUPLING HALF
Y-CONNECTION
2015-B REDUCER
DISCHARGE HOSE
Y-CONNECTION
DISCHARGE HOSE
NOZZLE
2015- B REDUCER
NOZZLE

19 Push cam arms on female quick-disconnect adapter on Y-connection forward to open position.

CAUTION

- To prevent leakage, close both cam arms at the same time
- Do not strike cam arms to close. Damage to couplings could result.

20 Connect female adapter on Y-connection to hose attached to hypochlorination unit. Close cam arms.

2-10. ASSEMBLY OF DISTRIBUTION POINTS (CONT)

21 Wrap antiseize tape (item 14, appendix D) around threads of 200-B coupling half. Screw coupling half into one end of 2 in. gate valve.

22 Push cam arms on 200-B coupling half forward to open position.

CAUTION

- To prevent leakage, close both cam arms at the same time.
- Do not strike cam arms to close. Damage to couplings could result.

23 Connect 200-B coupling half on gate valve to male adapter on Y-connection. Close cam arms.

24 Wrap antiseize tape (item 14, appendix D) around threads of 200-F coupling half. Screw coupling half into other end of gate valve attached to Y-connection.

25 Push cam arms on 2 in. x 20 ft discharge hose forward to open position.

CAUTION

- To prevent leakage, close both cam arms at the same time.
- Do not strike cam arms to close. Damage to couplings could result.

26 Connect hose to 200-F coupling half on gate valve. Close cam arms.

27 Push cam arms on second Y-connection forward to open position.

CAUTION

- To prevent leakage, close both cam arms at the same time.
- Do not strike cam arms to close. Damage to couplings could result.

28 Connect female adapter on second Y-connection to hose attached to first Y-connection. Close cam arms.

2-10. ASSEMBLY OF DISTRIBUTION POINTS (CONT)

29 Push cam arms on two 2 in. x 20 ft discharge hose assemblies forward to open position.

CAUTION

- To prevent leakage, close both cam arms at the same time.
- Do not strike cam arms to close. Damage to couplings could result.

30 Connect each hose assembly to male adapters on second Y-connection. Close cam arms.

31 Repeat steps 21 thru 30 to connect gate valve, hose assemblies, and miscellaneous fittings to other end of first Y-connection (attached to discharge hose from hypochlorination unit).

NOTE

If distribution point is used to fill 500 gal. collapsible drums, skip steps 32 thru 38. Install one or two 2015-DA reducer(s) on hose ends. If tank trucks are filled, install either 2030DA-AL or 2040DA-AL reducers to match truck fitting. When reducers are installed on hose ends, water flow is controlled by gate valve.

32 Wrap antiseize tape (item 14, appendix D) around threads on two 2015-B reducers. Screw reducer in each of two nozzles.

33 Push cam arms on two reducers attached to nozzles forward to open position.

CAUTION

- To prevent leakage, close both cam arms at the same time.
- Do not strike cam arms to close. Damage to couplings could result.

34 Connect two reducers to two discharge hoses on third Y-connection. Close cam arms.

35 Push cam arms on ends of two 2 in. elbow valves forward to open position.

2-10. ASSEMBLY OF DISTRIBUTION POINTS (CONT)

CAUTION

- To prevent leakage, close both cam arms at the same time.
- Do not strike cam arms to close. Damage to couplings could result.

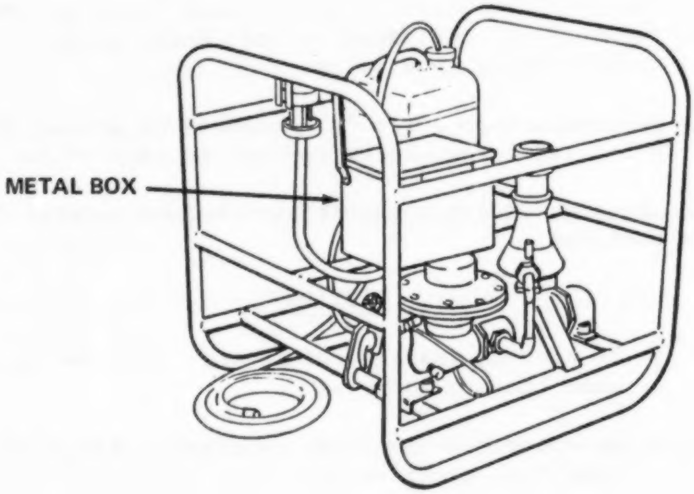
36 Connect two elbow valves to two discharge hoses on second Y-connection. Close cam arms.

37 Push cam arms on open ends of two elbow valves forward to open position.

CAUTION

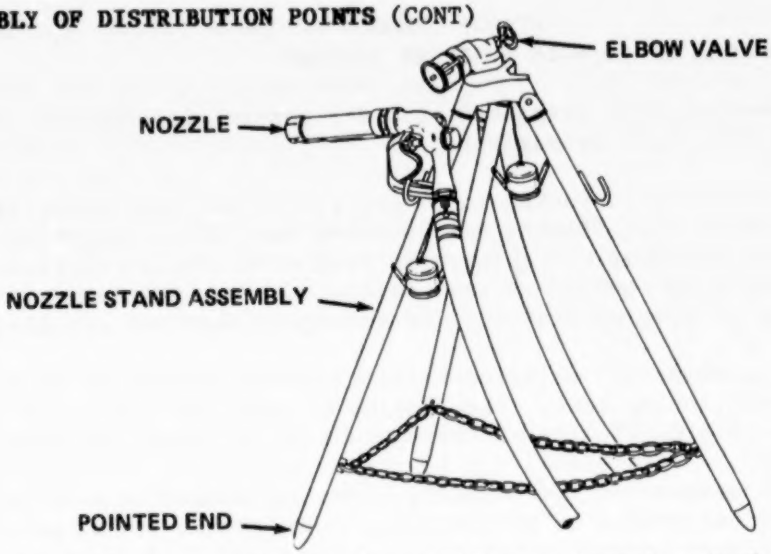
- To prevent leakage, close both cam arms at the same time.
- Do not strike cam arms to close. Damage to couplings could result.

38 Connect two 200-DP dust plugs to two elbow valves. Close cam arms.

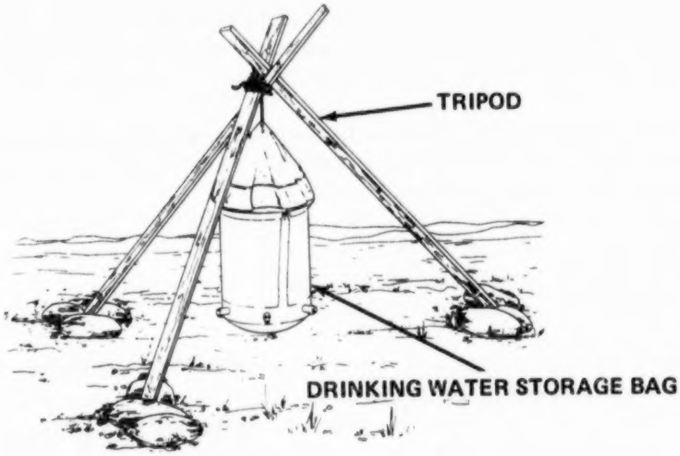


39 Store color comparator kit in metal box mounted on skid of hypochlorination unit.

2-10. ASSEMBLY OF DISTRIBUTION POINTS (CONT)


ELBOW VALVE
NOZZLE
NOZZLE STAND ASSEMBLY
POINTED END

40 Install two nozzle stand assemblies. Spread tripod legs and secure legs with rocks or embed pointed ends in ground. Locate nozzle stand assemblies at convenient spots for hanging up distribution point nozzles and elbow valves.


TRIPOD
DRINKING WATER STORAGE BAG

NOTE

Tripods must be at least 6 ft tall and capable of supporting 400 lb.

41 Using locally available materials, construct tripod supports on which to hang drinking water storage bags. Hang water bags on tripods.

2-11. ASSEMBLY OF 10-MILE HOSELINE SEGMENT

a. General. This paragraph provides general instructions for assembly of the 10-mile hoseline segment.

(1) Hoseline is packed in 33 crates. Each crate contains four flaking boxes. Each flaking box contains one 500 ft length of hoseline. Installation of 10-mile segment will require at least 27 crates (108 flaking boxes) of hoseline. Use enough hoseline to provide slack so that connections to pumping stations and storage assemblies are easily made.

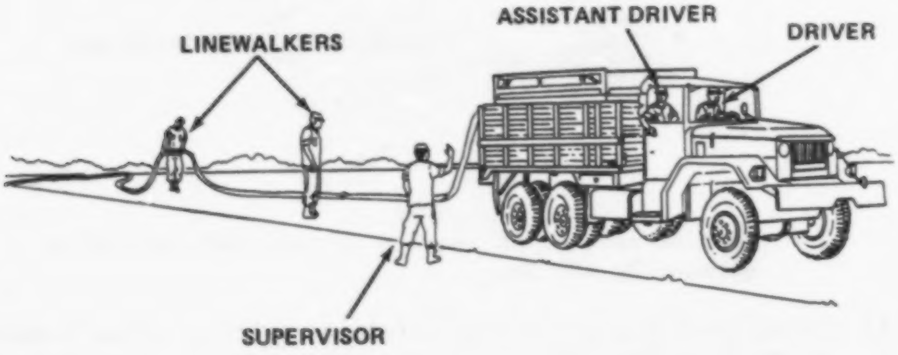
(2) Hoseline is installed by flaking hose from rear of truck and manually positioning hose. The lengths of hose are connected together using grooved pipe couplings. Every 1000 ft, a swivel joint is installed.

(3) A maximum of four flaking boxes are loaded onto a 2-1/2 ton cargo truck. TWDS may contain flaking boxes which can be lifted only from the sides and cannot be approached from tailgate end. If truck used does not have removable side walls or stakes, the bottom flaking box must have forklift openings at tailgate end, or be loaded by lifting sling.

CAUTION

Hose lengths should be snaked slightly to allow at least 3 ft of slack for each hoseline length. Contraction of taut hoseline during startup will damage equipment.

(4) As truck moves forward along route, hose flakes out of boxes and is manually laid out behind the truck. Any bends, twists, or kinks in hoseline must be straightened.



2-11. ASSEMBLY OF 10-MILE HOSELINE SEGMENT (CONT)

(5) A minimum of two trucks with crews of five men each is recommended for hose-laying operations. Crews alternate between laying hose and reloading trucks. Individual task assignments for each crewmember are as follows:

(a) Supervisor. One supervisor is needed per truck to oversee hose-laying operations. Should a problem develop during hose-laying operations, the supervisor is responsible for contacting operators at pumping stations who are packing the hoseline.

(b) Driver. One driver is needed to operate each truck.

(c) Assistant Driver. An assistant driver is needed to observe hose-laying operation, tell driver to speed up, slow down, or stop truck depending on needs of the line walkers straightening and repositioning hoseline. He must also observe hose for catching or binding as it flakes out of box.

(d) Linewalkers. A minimum of two linewalkers are needed to follow behind each truck and perform following tasks:

- Straighten out kinks or bends in hoseline.
- Remove small obstructions, branches, and sharp rocks which can damage hoseline.
- Check that swivel joint is installed at every 1000 ft connection.

(6) Empty hose is easily blown by strong winds, causing damage to installations and equipment. To avoid high wind problems, pack newly-laid hose as soon as possible. Once lead pump and first boost pump are connected by hoseline, see operating procedures and pack hoseline.

(7) During hose-laying operations, it is essential that operators at pumping stations and storage assemblies communicate with each other and with hose-laying crews. If a problem develops with the hose-laying operation, immediately notify operators who are packing hoseline. If a problem occurs when hoseline is packed, immediately notify hose-laying supervisor and other operators.

b. Assembly Requirements

(1) Assembly of the 10-mile hoseline segment requires the equipment and personnel outlined in paragraph 2-11a. These requirements generally remain the same in each situation. However, the number of components required for assembly will vary depending on the route and terrain being crossed, as well as the assigned mission.

2-11. ASSEMBLY OF 10-MILE HOSELINE SEGMENT (CONT)

(2) Hoseline is packed in 33 crates marked HOSE ASSEMBLY, 6 INCH, 500 FEET. Each crate contains four flaking boxes; each flaking box contains one 500 ft hose sssembly. Installation of a full 10-mile segment, along a direct route across even terrain, will require at least 108 flaking boxes of hoseline (para 2-11a).

(3) One grooved pipe coupling is required for each 500 ft hoseline assembly used. One swivel joint is required for every 1000 ft of hoseline. For example, if 108 flaking boxes of hoseline are used, then 108 grooved pipe couplings and 54 swivel joints are required for installation (para 2-5).

(4) Road crossing guards and suspension kits are used when the hoseline crosses roads or obstacles in the terrain (such as streams, rivers, gulleys, and ravines). Each road crossing guard is 5 ft in length. If the width of a road being crossed is 15 ft, for example, then three or four road crossing guards are required to protect the hoseline (para 2-11e). Each suspension kit contains enough wire rope to construct a span of 200 feet. Therefore, one suspension kit is required to cross a 150 ft wide ravine; or one suspension kit can be used to construct spans across two 75 ft wide gulleys (para 2-11f).

(5) The pressure-reducing valve is needed when pressure at a certain point in the hoseline is expected to exceed 225 psi (para 2-11g). If the hoseline crosses over a steep hill or ridge, then a pressure-reducing valve may be required on the "downhill" side of the hoseline route (para 2-11g).

(6) Other components contained in the 10-MILE SEGMENT crate are used for various purposes. The lifting sling is used when a forklift is not available to load flaking boxes onto trucks (para 2-5). The end cap is used when dead-end service is required (end of hoseline route does not connect to a storage and/or distribution assembly). The repair kit is used to repair damaged hoseline (para 2-5). The displacement and evacuation kit along with the packing kits are used to recover and pack hoseline in flaking boxes (para 2-5).

2-11. ASSEMBLY OF 10-MILE HOSELINE SEGMENT (CONT)

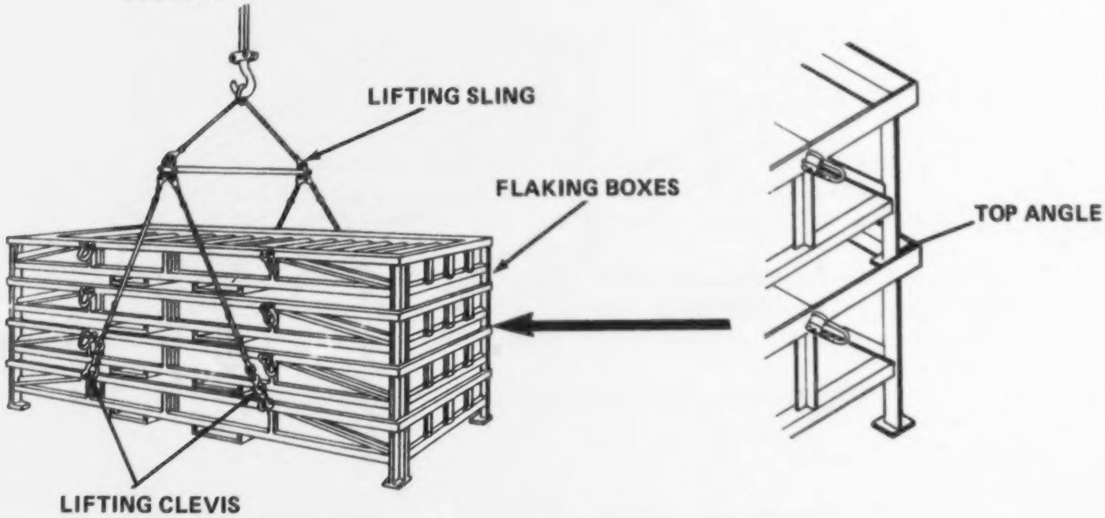
(7) Listed below are the total number, size, and type of components packed in the 10-MILE SEGMENT crate. Remove the required components needed to complete the assigned mission. Inspect each part for damage and operability (para 2-5).

10-MILE SEGMENT Crate

Qty	Size	Item
2		Displacement and evacuation kit
1	6 in.	End cap
15	6 in.	Grooved pipe coupling
1		Lifting sling
1		Packing kit
1		Pressure-reducing valve, skid-mounted
1	6 in.	Pressure relief valve and nipple
1		Repair kit
24	5 ft	Road crossing guard
4	1-1/4 in.	Socket wrench
4		Socket wrench handle
5		Suspension kit
65	6 in.	Swivel joint and coupling

c. Preparation for Hose Laying. To prepare for hose laying, flaking boxes are first loaded on truck. A forklift or crane with lifting sling is used for loading. After truck is loaded, tailgate assemblies on boxes are replaced with fabric breakaways.

1 After flaking boxes have been removed from crate, proceed as follows:



(a) Make sure each flaking box is properly alined and nested in top angle of flaking box below.

2-11. ASSEMBLY OF 10-MILE HOSELINE SEGMENT (CONT)

WARNING

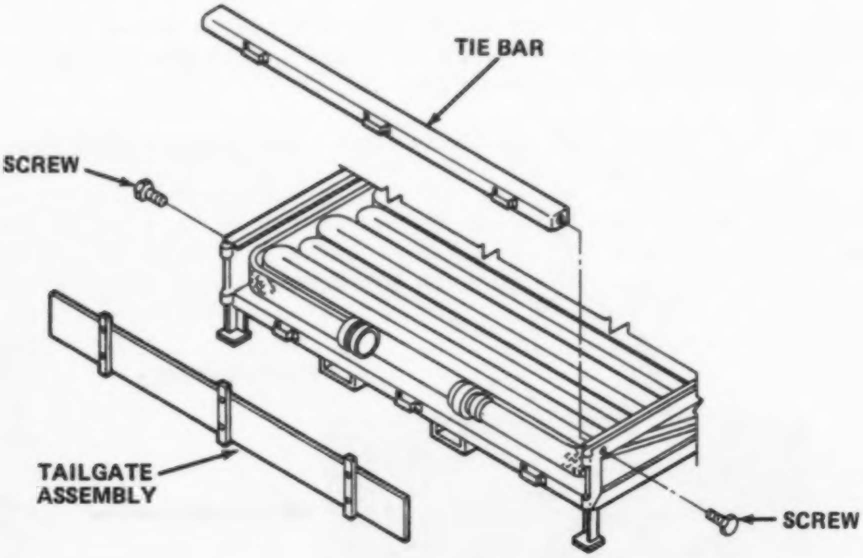
Make sure crane or forklift has minimum lifting capacity of 6000 lb. DO NOT stand under load being lifted. Death or serious injury may result.

NOTE

If using lifting sling, attach hooks to clevises on bottom flaking box. Be sure open ends of hooks face outward.

(b) Using crane or forklift with 6000 lb lifting capacity, lift and stack flaking boxes on truck bed. Do not load or stack more than four flaking boxes on one truck at a time. Position flaking boxes on truck bed with tailgate assemblies facing to rear.

(c) If truck does not have side walls, use lifting clevises as attachment points and securely tie boxes to truck.



2 Remove two screws on rear of bottom flaking box that secure tie bar assembly to box.

2-11. ASSEMBLY OF 10-MILE HOSELINE SEGMENT (CONT)

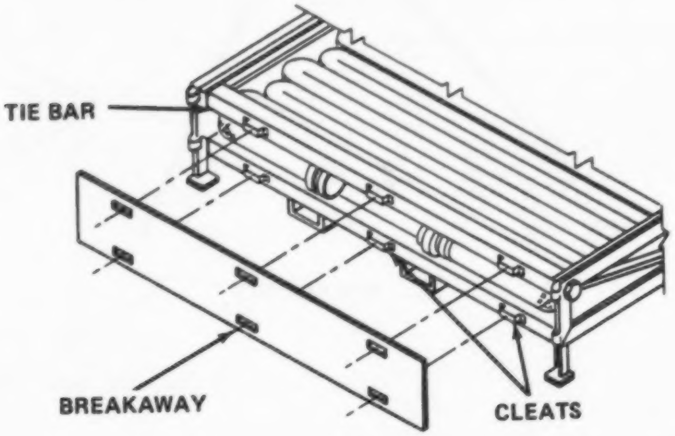
3 Lift and remove tie bar from flaking box.

4 Lift and remove tailgate assembly.

5 Install tie bar on flaking box.

6 Install two screws. Tighten screws until tie bar is firmly secured to flaking box.

7 Repeat steps 2 thru 6 for other three flaking boxes.



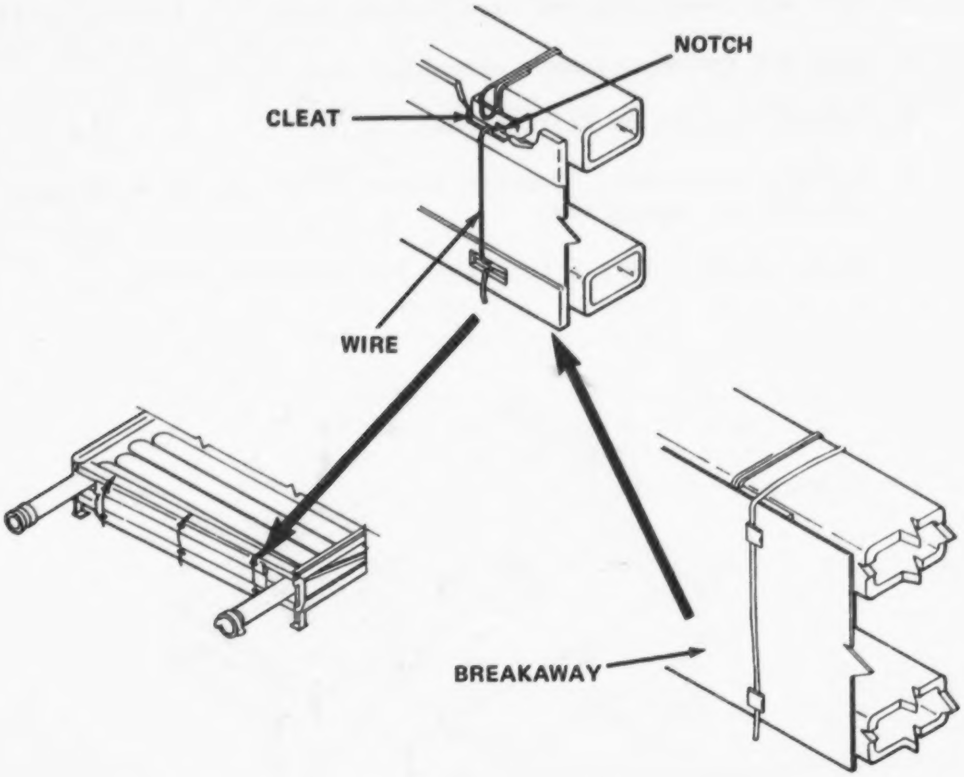
NOTE

Do not secure breakaways too tightly. Breakaways must fall away automatically during hose-laying operation. Recover and retain breakaways for reuse.

8 Position breakaway so that holes in breakaway are alined with cleats on tie bar on top flaking box. Leave both ends of hose outside openings on either side of breakaway.

9 Locate three lengths of wire provided with breakaway.

2-11. ASSEMBLY OF 10-MILE HOSELINE SEGMENT (CONT)



10 Wrap end of one wire twice around tie bar at point where one of cleats is welded to bar. Wire should not pass over outside of cleat.

11 Loop wire through notch in cleat as shown.

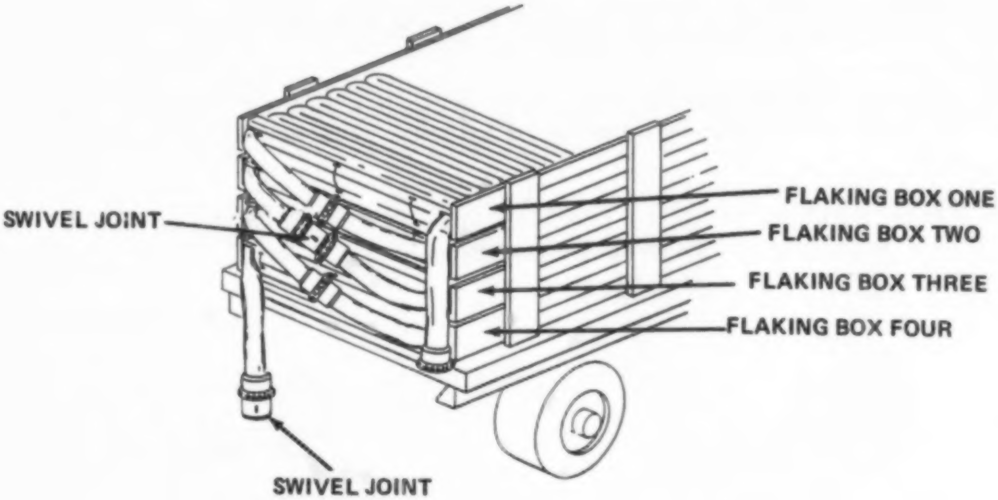
12 Bring wire over outside of breakaway and back through notch in cleat on bottom of flaking box.

13 Leave bottom end of wire hanging.

14 Repeat steps 10 thru 13 to attach two remaining wire lengths to other cleats on tie bar and flaking box.

15 Repeat steps 10 thru 14 for other three flaking boxes.

2-11. ASSEMBLY OF 10-MILE HOSELINE SEGMENT (CONT)


SWIVEL JOINT
FLAKING BOX ONE
FLAKING BOX TWO
FLAKING BOX THREE
FLAKING BOX FOUR
SWIVEL JOINT

d. Hose Laying and Installation

CAUTION

After removing components from boxes, be sure to protect them from sand and grit.

NOTE

Remove caps or packaging material from ends of hose.

1 Remove 6 in. grooved pipe coupling (para 2-6) from leading ends of hose in flaking box one thru four.

CAUTION

After removing components from boxes, be sure to protect them from sand and grit.

2 Connect leading end of hose in flaking box four to trailing end of hose in flaking box three with grooved pipe coupling (para 2-6).

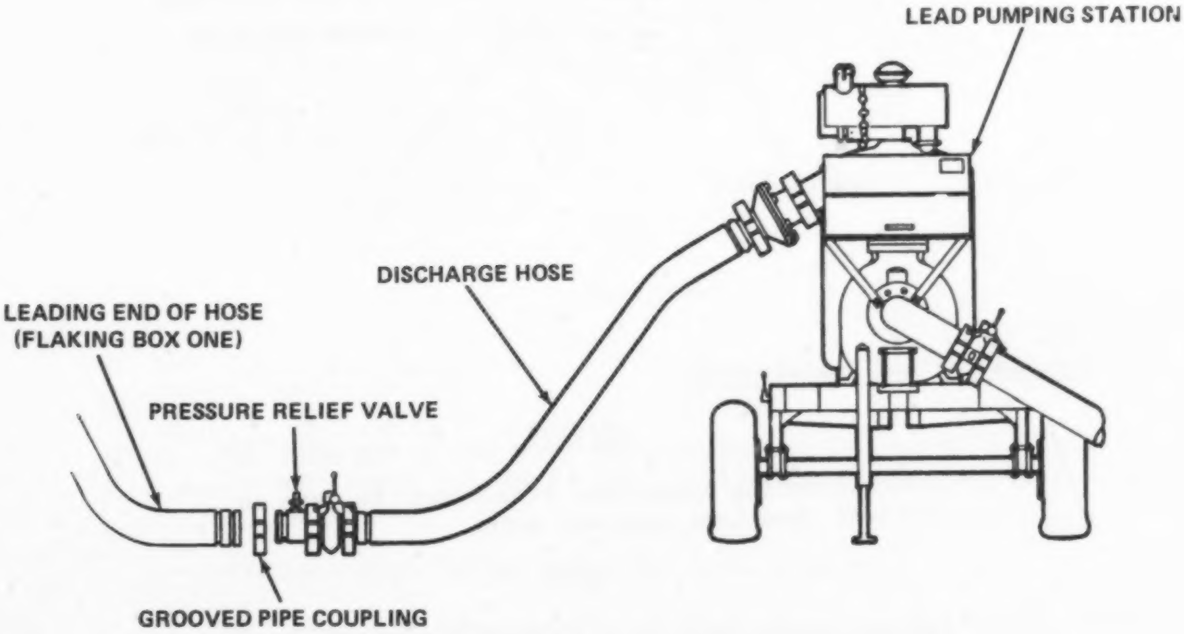
2-11. ASSEMBLY OF 10-MILE HOSELINE SEGMENT (CONT)

3 Connect swivel joint to leading end of hose in flaking box three with grooved pipe coupling (para 2-6).

4 Connect trailing end of hose in flaking box two to swivel joint with grooved pipe coupling (para 2-6).

5 Connect leading end of hose in flaking box two to trailing end of hose in flaking box one with grooved pipe coupling (para 2-6).

6 Connect swivel joint to trailing end of hose in flaking box four with grooved pipe coupling (para 2-6).


LEAD PUMPING STATION
DISCHARGE HOSE
LEADING END OF HOSE
(FLAKING BOX ONE)
PRESSURE RELIEF VALVE
GROOVED PIPE COUPLING

7 Connect leading end of hose in flaking box one to pressure relief valve on discharge hose assembly at lead pumping station. Attach leading end of hoseline length with 6 in. grooved pipe coupling (para 2-6).

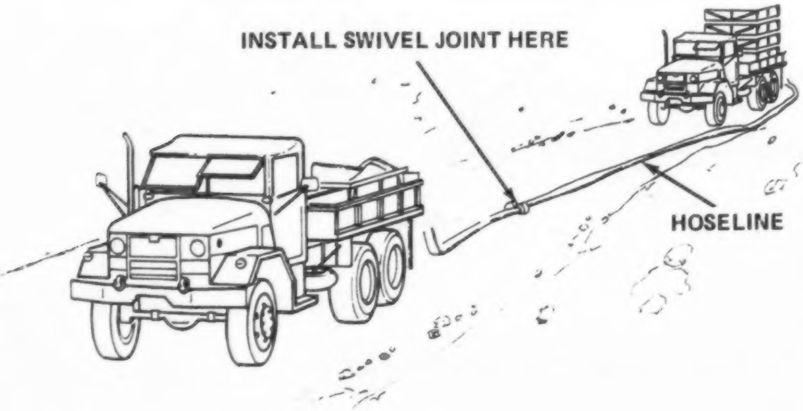
2-11. ASSEMBLY OF 10-MILE HOSELINE SEGMENT (CONT)

CAUTION

Do not leave hose on roadway or track that will be used by other vehicles. Hoseline is easily damaged by rough handling or abrasive contact with rocks.

8 Restrain hose manually until first 50 ft of hose are in position. After 50 ft of hose are in position, the weight of the hose will hold line in place.

9 Continue to lay hose until hoseline in all four boxes has been flaked.



CAUTION

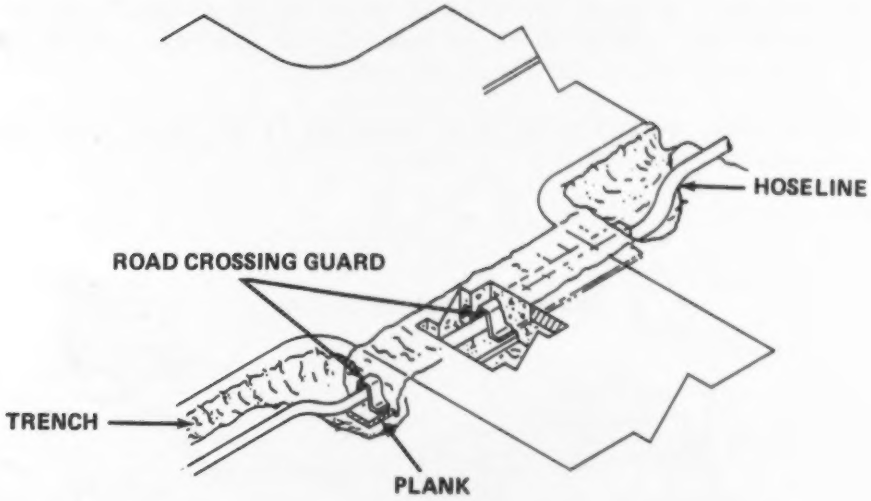
Swivel joints must be installed at every 1000 ft in hoseline. If not installed, hoseline will twist during startup and cause damage to equipment.

10 Repeat steps 1 thru 9 (leaving out step 7) to connect each truckload of hoseline to sections already laid.

11 Connect hoseline to each boost pumping station and storage assembly as those installation sites are reached.

12 Retain empty flaking boxes, tailgates, and breakaways for reuse.

2-11. ASSEMBLY OF 10-MILE HOSELINE SEGMENT (CONT)



e. Installation of Road Crossing Guards

1 Dig trench 18 in. deep across road or railbed.

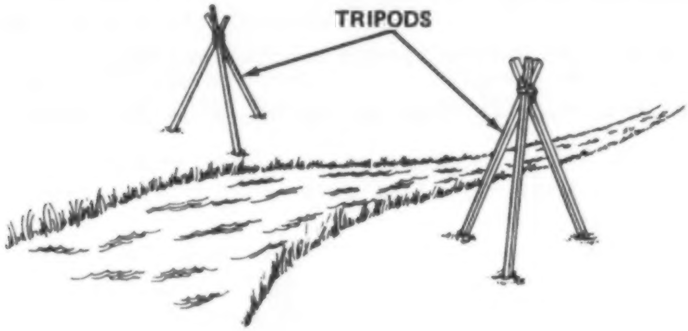
2 If hoseline is being run beneath a railroad bed, place additional planking in trench before laying hoseline. Planking may also be used in roadway crossings.

3 Lay hoseline in trench.

4 Position roadway crossing guards over hoseline at appropriate intervals. Nail guards to plank if used.

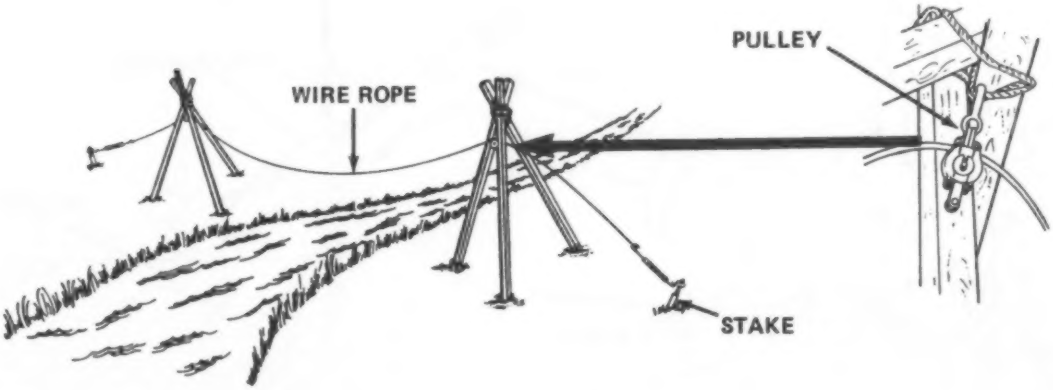
5 Backfill trench using dirt removed in step 1. Fill trench to a level 1 to 2 in. above original roadbed before packing earth down.

2-11. ASSEMBLY OF 10-MILE HOSELINE SEGMENT (CONT)



f. Assembly and Installation of Suspension Devices

1 Using available materials, construct a tripod on either side of stream, gap, or other obstruction to be spanned. Tripods should be strong and high enough to support hoseline.



NOTE

Depending on the type of suspension kit issued with the equipment, anchor stakes will either be angled or round.

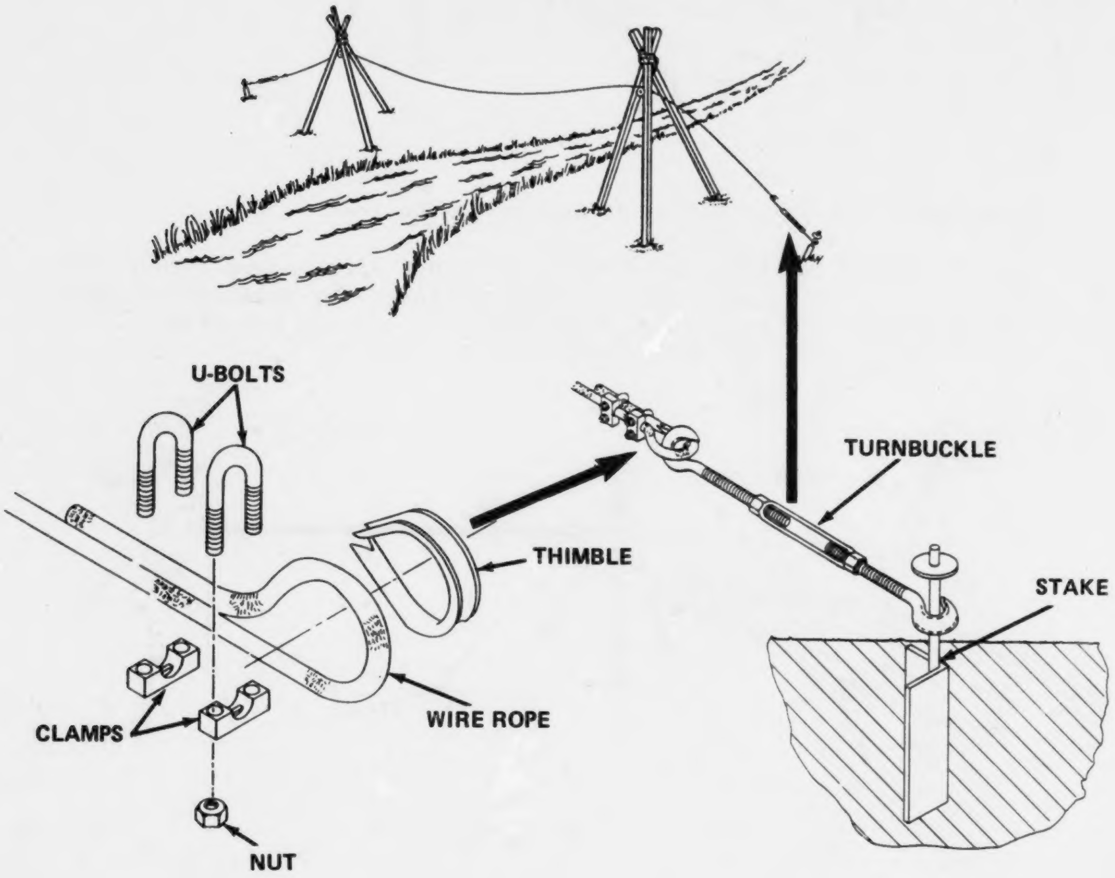
2 Using driving head, drive an anchor stake into ground at a 30° angle approximately 15 ft from each tower. Stakes should be in line with tripods and extend approximately 6 in. above ground.

2-11. **ASSEMBLY OF 10-MILE HOSELINE SEGMENT** (CONT)

3 Hang a pulley block from each tripod and thread wire rope through pulley on near side.

4 Pull wire rope across stream or obstruction.

5 Thread wire rope through pulley block on far side.


U-BOLTS
TURNBUCKLE
THIMBLE
STAKE
CLAMPS
WIRE ROPE
NUT

6 Construct loop of wire rope about 9 in. from one end of rope and insert thimble into loop.

7 Locate two clamp assemblies. Remove two nuts and one clamp from each U-bolt.

2-11. ASSEMBLY OF 10-MILE HOSELINE SEGMENT (CONT)

8 Place one U-bolt over doubled portion of wire rope approximately 1/2 in. from thimble.

9 Install clamp and two bolts. Tighten nuts until doubled portion of wire rope is held firmly together.

10 Place second U-bolt over doubled portion of wire rope, approximately 4 in. down from first clamp.

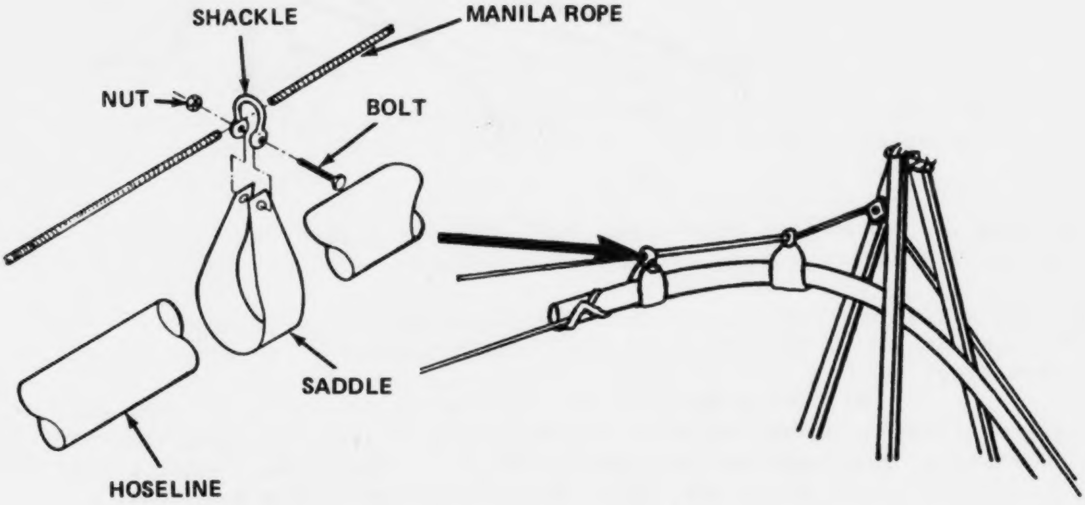
11 Install clamp and two nuts. Tighten nuts until doubled portion of wire rope is held firmly together.

12 Unscrew turnbuckle until it is almost fully extended. This will allow for adjustment to take up wire rope sag.

13 Attach one turnbuckle hook to loop in wire rope. Attach other turnbuckle hook to stake.

14 Repeat steps 6 thru 13 with opposite end of wire rope.

15 Using turnbuckles, adjust sag in wire rope (with no load) until rope is taut.



16 Tie manila rope to leading end of hoseline. Make sure rope is long enough to cross span.

best copy available

2-11. ASSEMBLY OF 10-MILE HOSELINE SEGMENT (CONT)

NOTE

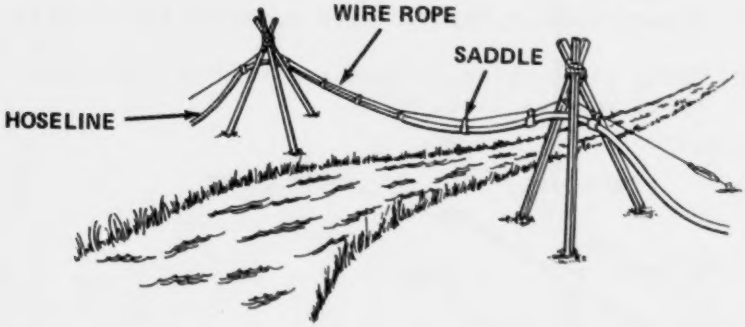
As each saddle assembly is disassembled, inspect saddle for tears and damaged or missing metal eyelets. Replace damaged saddles.

17 Locate saddles, bolts, and shackles.

18 Place shackle over wire rope beyond pulley on span side.

19 Lift hose end and wrap saddle around hose.

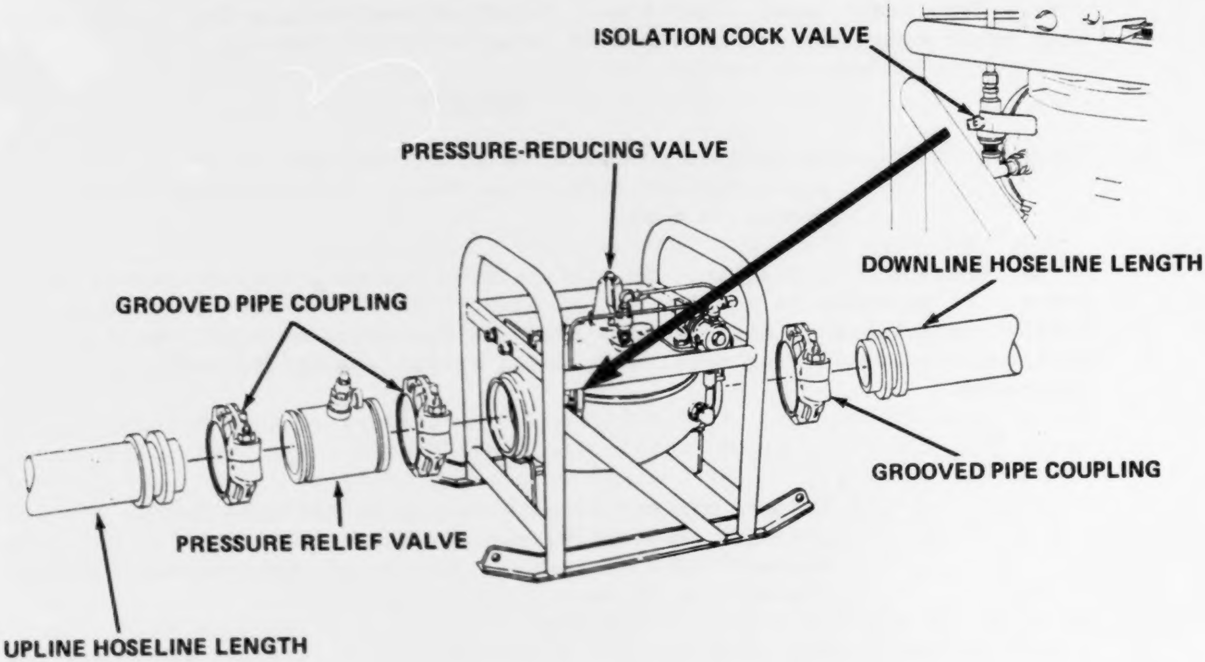
20 Install bolt through saddle eyes and shackle. Tighten bolt until saddle assembly is secured to wire rope.



21 Using manila rope, pull hoseline across stream, gap, or obstruction. Repeat steps 17 thru 20, attaching additional saddles to hoseline at 5 ft intervals. Saddles will travel along wire rope, providing support for hoseline.

22 When hoseline is in place, use three or more U-bolt clamps to secure end shackles to wire rope.

2-11. ASSEMBLY OF 10-MILE HOSELINE SEGMENT (CONT)


ISOLATION COCK VALVE
PRESSURE-REDUCING VALVE
DOWNLINE HOSELINE LENGTH
GROOVED PIPE COUPLING
GROOVED PIPE COUPLING
PRESSURE RELIEF VALVE
UPLINE HOSELINE LENGTH

g. Assembly and Installation of Pressure-Reducing Valve

1 Remove 6 in. grooved pipe coupling (para 2-6) connecting hoseline lengths where pressure-reducing valve is to be installed.

2 Locate 6 in. pressure relief valve with attached 6 in. grooved pipe coupling. Remove 6 in. grooved pipe coupling (para 2-6).

3 Install 6 in. pressure relief valve on inlet connection of pressure-reducing valve. Use 6 in. grooved pipe coupling removed from pressure relief valve in step 2 above (para 2-6).

4 Connect upline hoseline length to 6 in. pressure relief valve. Use 6 in. grooved pipe coupling removed from hose connection in step 1 above (para 2-6).

5 Connect downline hoseline length to outlet connection on 6 in. pressure-reducing valve with 6 in. grooved pipe coupling (para 2-6).

6 Place isolation cock valves in open position.

2-12. OPERATING PROCEDURE: GENERAL

a. This paragraph provides general instructions for operation of the entire TWDS under usual conditions. Detailed instructions for operation of each major component are provided in paragraphs 2-13 through 2-16.

CAUTION

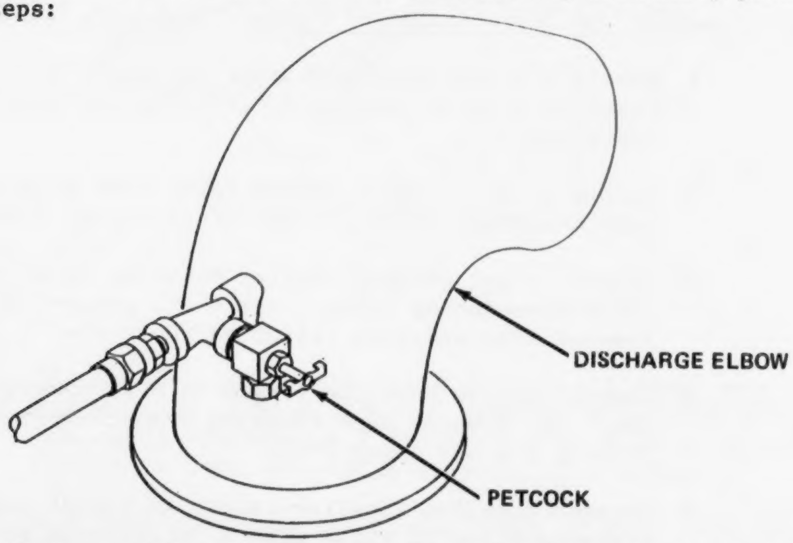
If suction pressure falls below 10 psi or if discharge pressure rises above 150 psi, damage can result to pump.

b. When packing hoseline, monitor suction and discharge pressures on pumps. If pressure is too low or too high, IMMEDIATELY shut down pumps. Notify supervisors on hose-laying crews and operators at other pumping stations who are packing hoseline. Cease operation until problem is corrected.

CAUTION

Trapped air can cause hoseline to collapse and pressure at downline pumping stations to fall below 10 psi. To prevent damage to pump, take precautions to vent air from hoseline.

c. As hose-laying crews connect major components, prepare TWDS for operation by packing hoseline. As soon as lead pumping station and first boost pumping station are installed and connected by hoseline, perform the following steps:



1 Turn petcock on boost pump discharge elbow to the left, until fully opened. This will allow air trapped inside hoseline to be vented as water column moves forward.

2-12. OPERATING PROCEDURE: GENERAL (CONT)

2 Notify operator(s) on lead pumping station to begin pump operation (para 2-13).

3 Observe hoseline for visual indications of approaching water. Listen for air escaping from petcock.

4 Close petcock on discharge elbow when water begins to flow out of petcock.

5 Notify operator(s) on lead pumping station to shut down pump operation (para 2-13).

6 Close butterfly valve on boost pump discharge hose to contain water column.

d. Begin moving water again when next downline station is installed and connected by hoseline. Repeat applicable steps above. Start up lead pump (para 2-13). Start up first boost pump (para 2-14). When water column reaches second boost pumping station, close petcock on discharge elbow, shut down pumps, and cease operation of system. Close butterfly valve on second boost pump discharge hose to contain water column.

e. Continue packing hoseline as each boost pumping station is installed and connected.

NOTE

Before storage tanks are filled, or complete operation of system begins, flush hoseline of sediment and debris.

f. To protect hose from damage in high winds, do not begin filling storage tanks until hoseline is packed. When system is ready for operation, see paragraph 2-15 for instructions on filling storage tanks.

g. Complete operation of TWDS can begin as soon as all pumping stations, storage assemblies, and distribution points have been installed and connected.

h. During startup of the complete system, run all pumps in manual or electric manual mode. After startup, boost pumping stations can be operated in electric automatic mode. However, the lead pump should always be operated in manual or electric manual mode.

2-12. OPERATING PROCEDURE: GENERAL (CONT)

i. When storage tanks are approaching maximum holding capacity, reduce speed on lead pump to decrease rate of downline water flow. If operating in electric automatic mode, rate of boost pumps should decrease automatically. If boost pumps are operating in manual or electric manual modes, operators will have to manually reduce pump speed. When storage tanks are filled to maximum capacity (height of tank reaches 5-1/2 ft), close gate valve on each storage assembly and shut down operation of pumping stations.

j. Operation of distribution points can begin when storage tanks contain enough water to allow a normal discharge rate (para 2-16).

k. Pumping rates during operation will vary, depending on amount of water being discharged at either distribution points, large storage and distribution units, or both. Pumping stations operate at intervals long enough to refill storage tanks if discharge rate is minimal. When water is pumped on a continual basis and boost pumping stations are operating in electric automatic mode, perform during (D) PMCS on trailer-mounted pump assemblies at a minimum of every 3 hours.

l. During all phases of operation, operators at pumping stations and storage assemblies must be in communication with each other. Any unusual situations or difficulties must be reported immediately.

(1) Since pumps are operated in manual or electric manual modes during startup, operators must monitor suction and discharge pressures on pumps. They must report low suction pressure or high discharge pressure and take corrective action immediately.

(2) Storage assembly operators should report beginning and completion of tank filling operations.

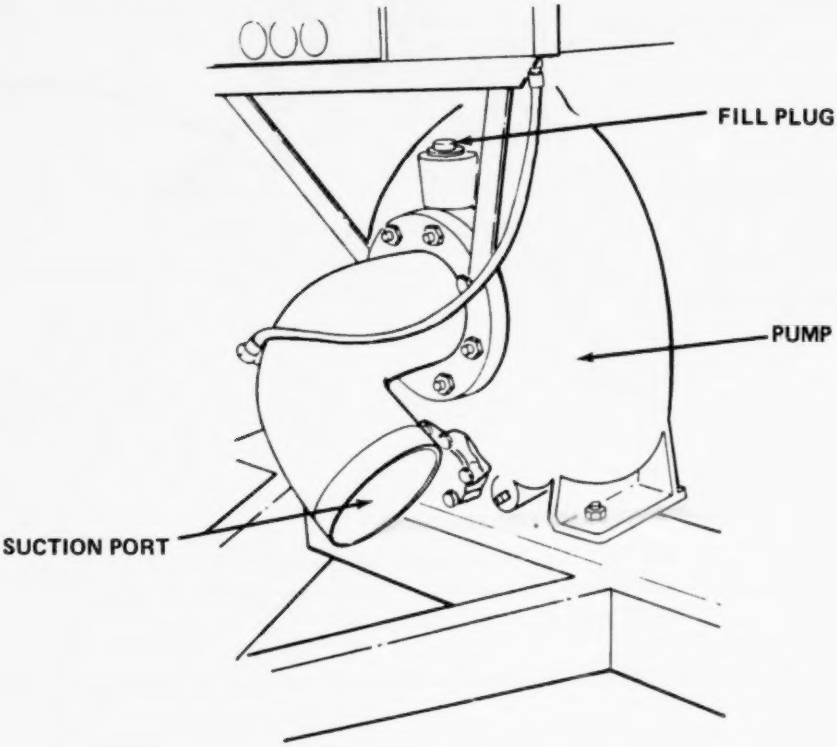
(3) Operators at lead pumping station should track status of advancing water column during flooding operation. During startup, they should monitor overall performance of system.

(4) Once operation of complete system begins, operators on each pumping station must continue to monitor suction and discharge pressures. They must report low suction pressure or high discharge pressure and take corrective action immediately.

2-13. OPERATION OF LEAD PUMPING STATION

a. Manual Mode: Unit 609

1 Perform before (B) preventive maintenance checks and services (PMCS).



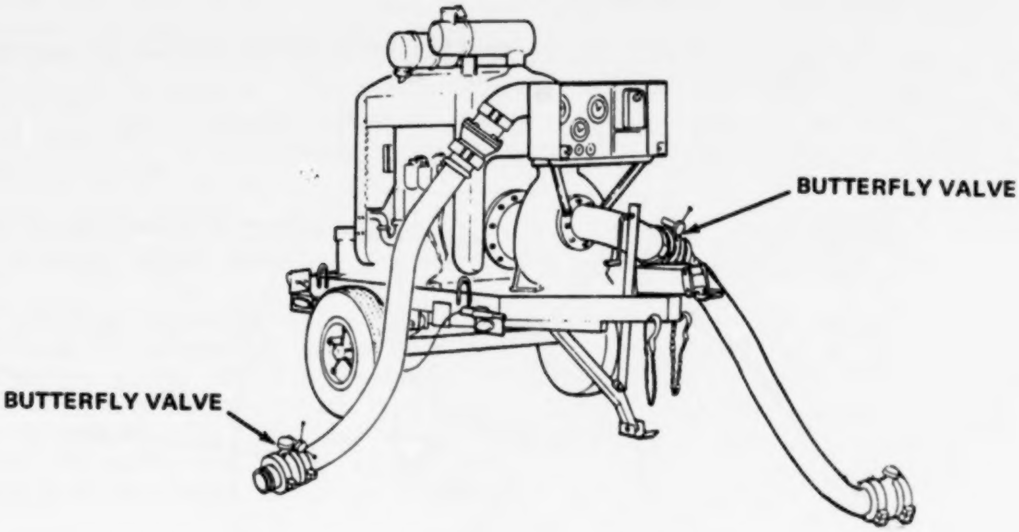
CAUTION

DO NOT operate pump unless casing is filled to level of suction port. Operating a dry pump will cause overheating and damage unit.

2 Remove fill plug at top of pump.

3 Fill pump casing with water to level of suction port. Reinstall plug tightly.

2-13. OPERATION OF LEAD PUMPING STATION (CONT)

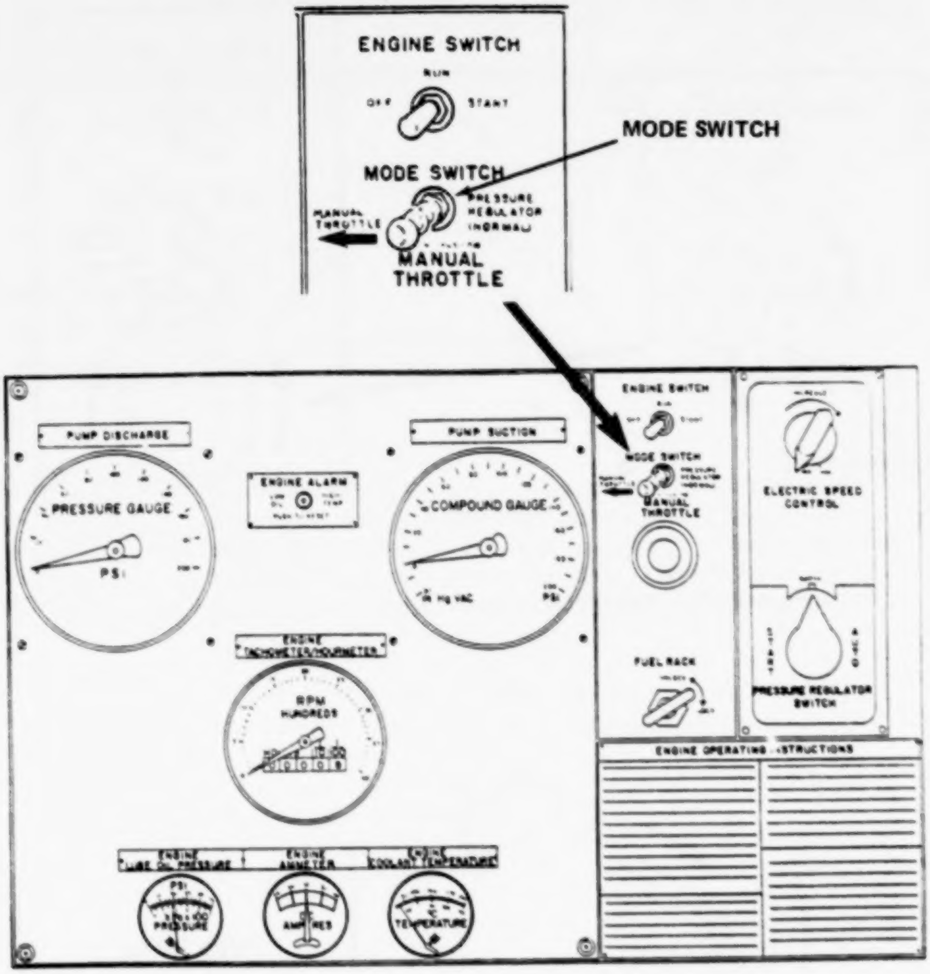

BUTTERFLY VALVE
BUTTERFLY VALVE

CAUTION

DO NOT operate pump against a closed suction or discharge valve. This can cause overheating and damage to pump unit.

4 Open butterfly valves on suction and discharge lines.

2-13. OPERATION OF LEAD PUMPING STATION (CONT)

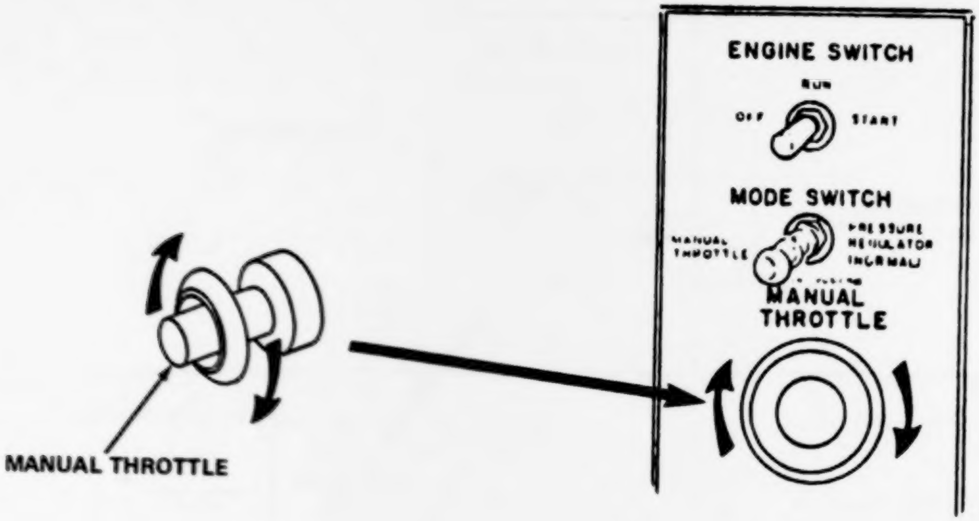

ENGINE SWITCH
RUN
OFF
START
MODE SWITCH
MODE SWITCH
PRESSURE REGULATOR (NORMAL)
MANUAL THROTTLE
MANUAL THROTTLE
PUMP DISCHARGE
PRESSURE GAUGE
PSI
ENGINE ALARM
PUMP SUCTION
COMPOUND GAUGE
IN HG VAC
PSI
ENGINE TACHOMETER/HOURMETER
RPM HUNDREDS
ENGINE LUBE OIL PRESSURE
PSI
PRESSURE
ENGINE AMMETER
AMPERES
ENGINE COOLANT TEMPERATURE
TEMPERATURE
FUEL RACK
ELECTRIC SPEED CONTROL
START
AUTO
PRESSURE REGULATOR SWITCH
ENGINE OPERATING INSTRUCTIONS

NOTE

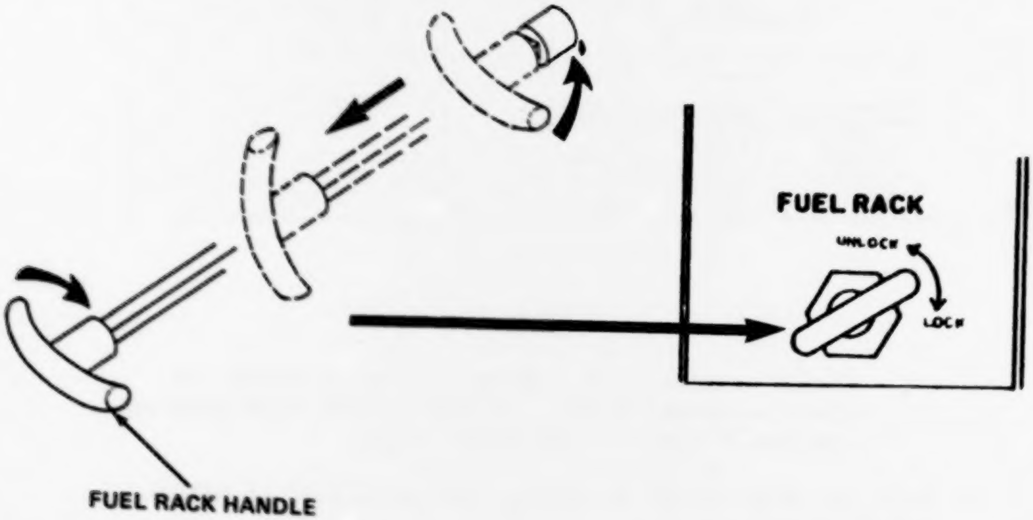
Always operate lead pumping station in manual or electric manual modes. DO NOT operate lead pumping station in electric automatic mode.

5 Pull out MODE SWITCH to unlock, and push left to MANUAL THROTTLE position.

2-13. OPERATION OF LEAD PUMPING STATION (CONT)

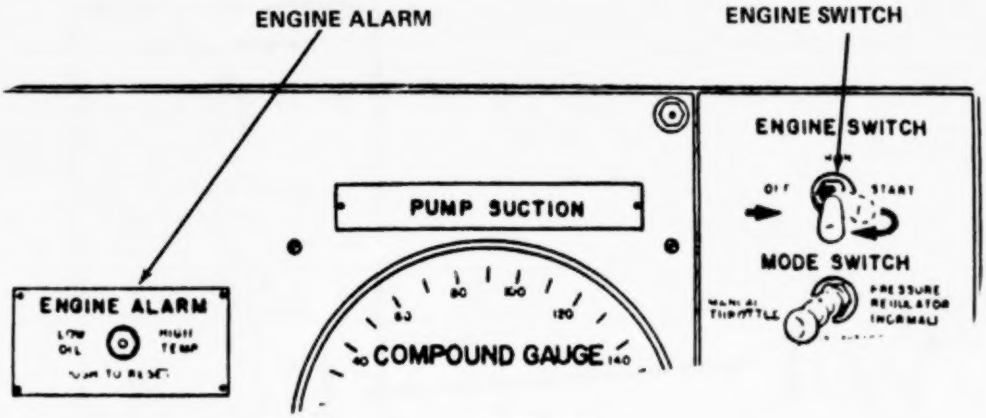

ENGINE SWITCH
RUN
OFF
START
MODE SWITCH
MANUAL THROTTLE
PRESSURE REGULATOR (NORMAL)
MANUAL THROTTLE
MANUAL THROTTLE

6 Turn MANUAL THROTTLE right until it is fully in.


FUEL RACK
UNLOCK
LOCK
FUEL RACK HANDLE

7 Turn FUEL RACK handle left to UNLOCK position. Pull handle fully out and turn right to LOCK position.

2-13. OPERATION OF LEAD PUMPING STATION (CONT)


ENGINE ALARM
ENGINE SWITCH
ENGINE SWITCH
OFF
START
MODE SWITCH
MANUAL THROTTLE
PRESSURE REGULATOR (NORMAL)
PUMP SUCTION
40
60
80
100
120
140
COMPOUND GAUGE
ENGINE ALARM
LOW OIL
HIGH TEMP
PUSH TO RESET

WARNING

- DO NOT operate engine around open fuel. Fuel presents an extreme explosion and fire hazard. Make sure fuel lines are securely connected and free of leaks. Never refuel hot or running engine. Avoid overfilling fuel tank. Always use correct type of fuel.
- Hearing protection must be worn by personnel standing within 50 ft of operating pump unit.

CAUTION

To prevent damage to starter, allow 3 minutes between start attempts.

NOTE

Engine alarm will sound if engine does not start within 30 seconds after ENGINE SWITCH is set to START position.

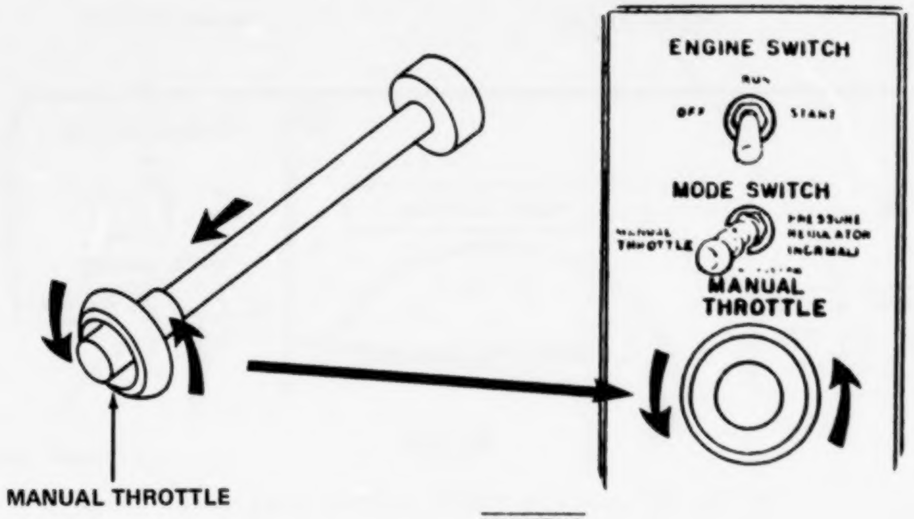
8 Push ENGINE SWITCH right to START position and hold until engine starts. When engine starts, release ENGINE SWITCH. Engine will run at idle speed (1000 rpm). If engine alarm sounds:

(a) Set ENGINE SWITCH to OFF position.

(b) Push ENGINE ALARM reset button.

(c) Allow 3 minutes before restarting engine.

2-13. OPERATION OF LEAD PUMPING STATION (CONT)


ENGINE SWITCH
RUN
OFF
START
MODE SWITCH
MANUAL THROTTLE
PRESSURE REGULATOR (NORMAL)
MANUAL THROTTLE
MANUAL THROTTLE

WARNING

If pump fails to take suction, pump can overheat. Overheated pumps can cause severe burns and injury.

NOTE

Suction is indicated by pressure reading on PUMP DISCHARGE gage or by a decrease in engine speed.

9 Turn MANUAL THROTTLE left until pump takes suction. If pump fails to take suction after 3 minutes or overheats, shut down engine (step 14). Notify organizational maintenance.

CAUTION

If suction pressure falls below 10 psi or if discharge pressure rises above 150 psi, damage can result to pump.

NOTE

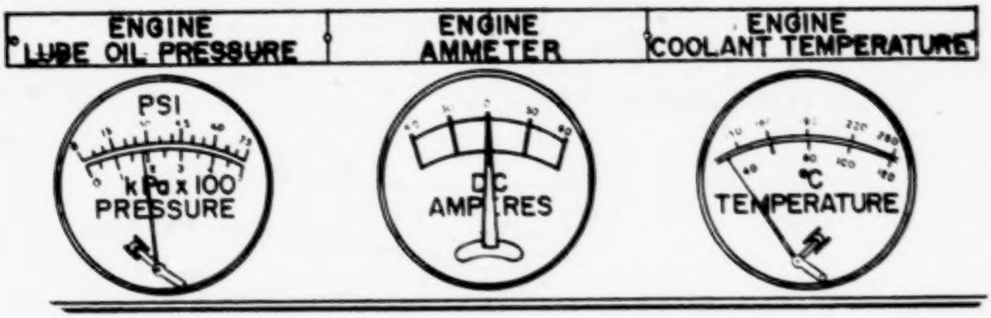
Suction and discharge pressures will vary depending on operating conditions and engine speed.

10 When pump is operated in manual mode, monitor suction and discharge pressures. If suction pressure falls below 10 psi or if discharge pressure rises above 150 psi, reduce engine speed to regain proper pressure. If needed, cut back to idle until problem is corrected.

2-13. OPERATION OF LEAD PUMPING STATION (CONT)

11 Use MANUAL THROTTLE to adjust engine speed. Turn left (out) to increase speed. Turn right (in) to decrease speed.

12 Perform during (D) PMCS.


ENGINE
LUBE OIL PRESSURE
PSI
kPa x 100
PRESSURE
ENGINE
AMMETER
DC
AMPERES
ENGINE
COOLANT TEMPERATURE
°C
TEMPERATURE

NOTE

Engine alarm will sound if engine operating temperature goes above 220°F (104°C) or oil pressure falls below 10 psi (69 kPa).

13 If engine alarm sounds:

(a) Check ENGINE COOLANT TEMPERATURE gage and ENGINE LUBE OIL PRESSURE gage.

(b) If engine temperature or oil pressure is not within proper limits, shut down engine (step 14).

(c) Push ENGINE ALARM reset button.

(d) Notify organizational maintenance.

2-13. OPERATION OF LEAD PUMPING STATION (CONT)

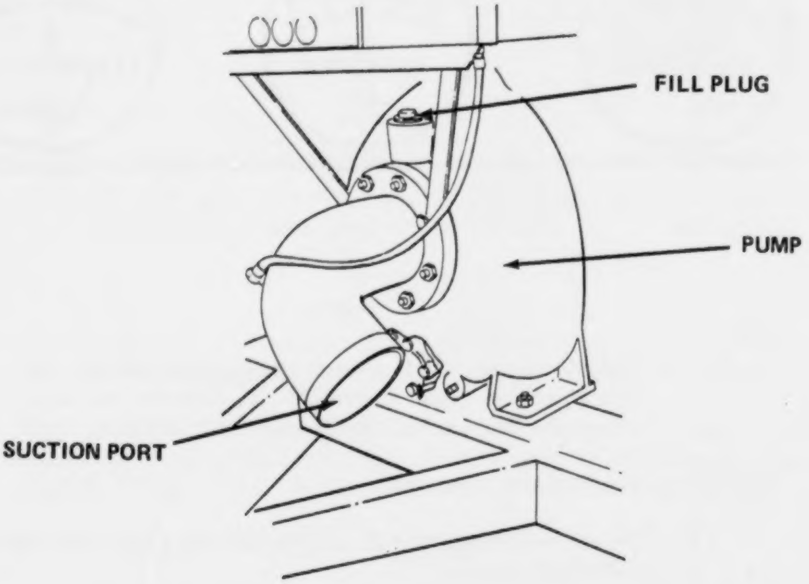
CAUTION

To prevent damage to engine, DO NOT shut engine down suddenly from full-load running. Let engine idle for a few minutes to allow for temperature balance.

14 To stop engine, turn MANUAL THROTTLE right to fully in position. Let engine idle for 2 or 3 minutes. Push ENGINE SWITCH left to OFF position. Engine will shut down.

b. Electric Manual Mode: Unit 609

1 Perform before (B) PMCS.



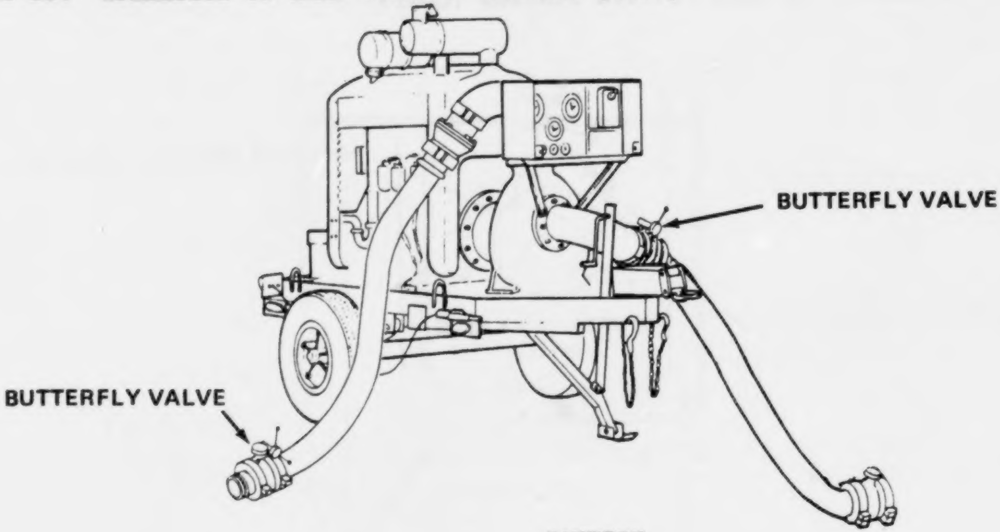
CAUTION

DO NOT operate pump unless casing is filled to level of suction port. Operating a dry pump will cause overheating and damage unit.

2 Remove fill plug at top of pump.

3 Fill pump casing with water to level of suction port. Reinstall plug tightly.

2-13. OPERATION OF LEAD PUMPING STATION (CONT)

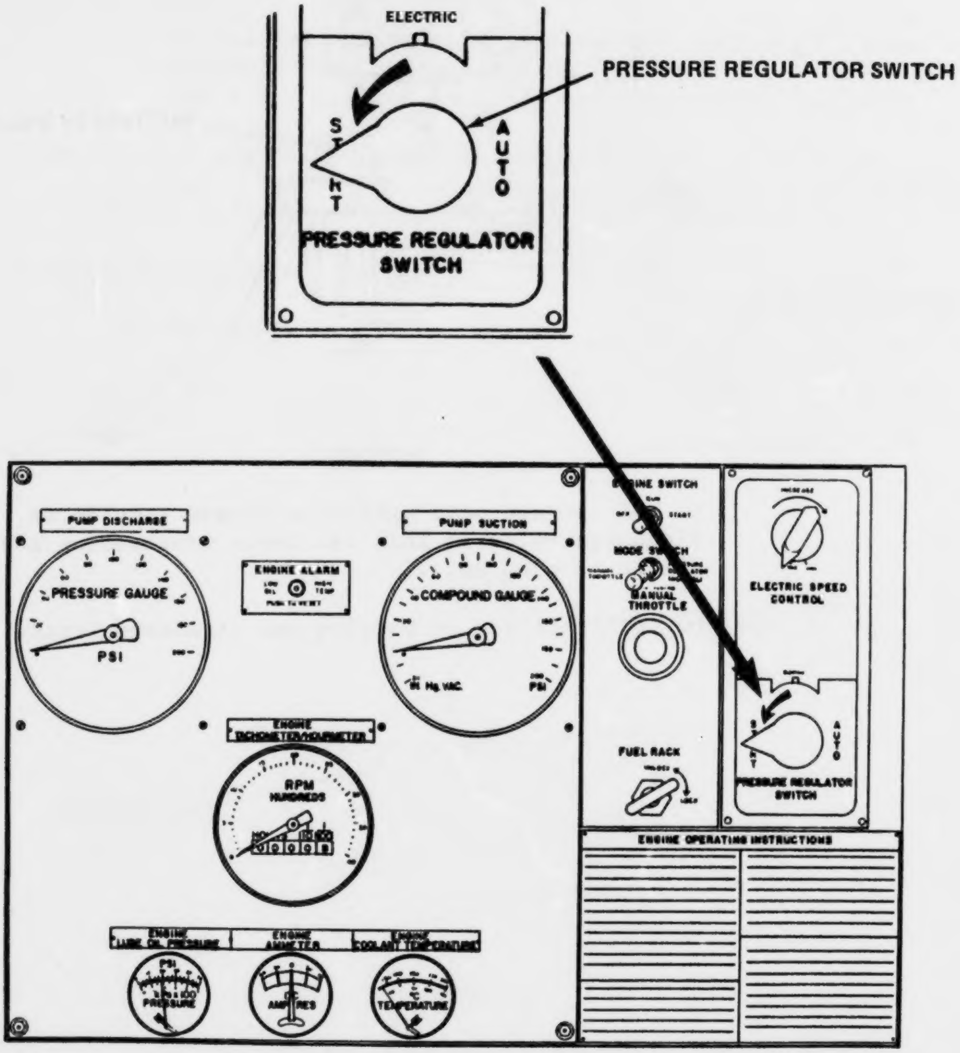

BUTTERFLY VALVE
BUTTERFLY VALVE

CAUTION

DO NOT operate pump against a closed suction or discharge valve. This can cause overheating and damage to pump unit.

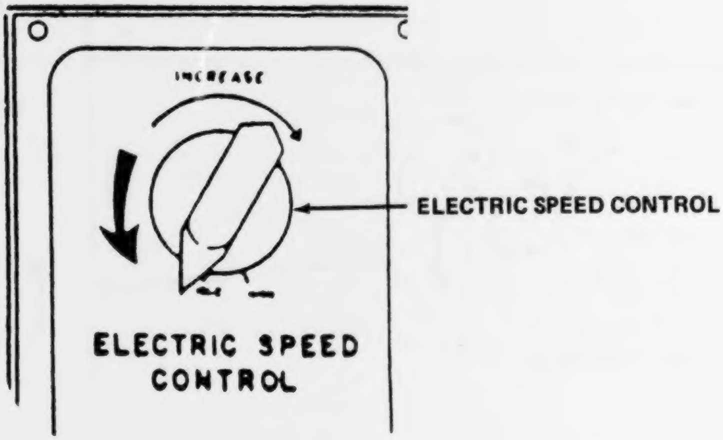
4 Open butterfly valves on suction and discharge lines.

2-13. OPERATION OF LEAD PUMPING STATION (CONT)

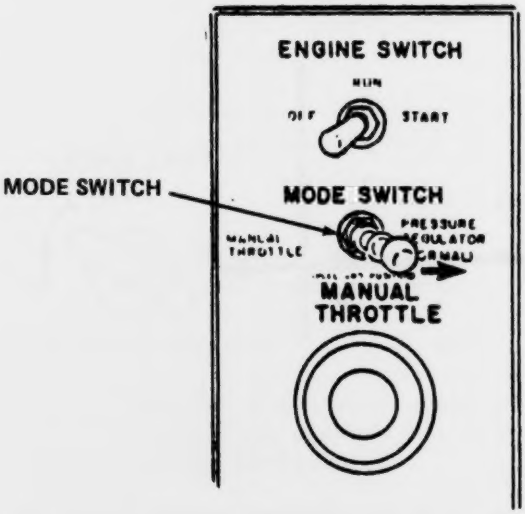

ELECTRIC
PRESSURE REGULATOR SWITCH
START
AUTO
PRESSURE REGULATOR SWITCH
PUMP DISCHARGE
PRESSURE GAUGE
PSI
ENGINE ALARM
PUMP SUCTION
COMPOUND GAUGE
IN. Hg. VAC.
PSI
ENGINE TACHOMETER/HOURMETER
RPM HUNDREDS
ENGINE SWITCH
MODE SWITCH
MANUAL THROTTLE
FUEL RACK
ELECTRIC SPEED CONTROL
PRESSURE REGULATOR SWITCH
ENGINE OPERATING INSTRUCTIONS
ENGINE LUBE OIL PRESSURE
PRESSURE
ENGINE AMMETER
AMPERES
ENGINE COOLANT TEMPERATURE
TEMPERATURE

5 Turn PRESSURE REGULATOR SWITCH left to START position.

2-13. OPERATION OF LEAD PUMPING STATION (CONT)

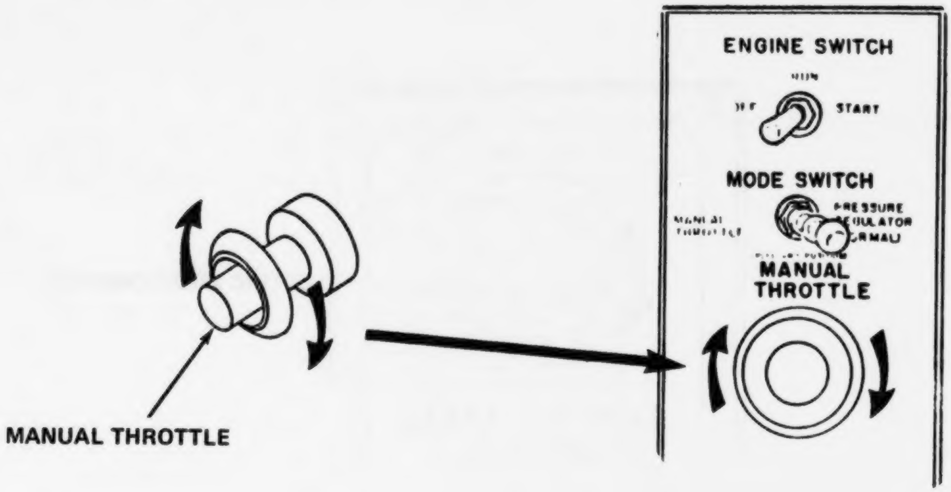

INCREASE
ELECTRIC SPEED CONTROL
ELECTRIC SPEED CONTROL

6 Turn ELECTRIC SPEED CONTROL left to IDLE position.

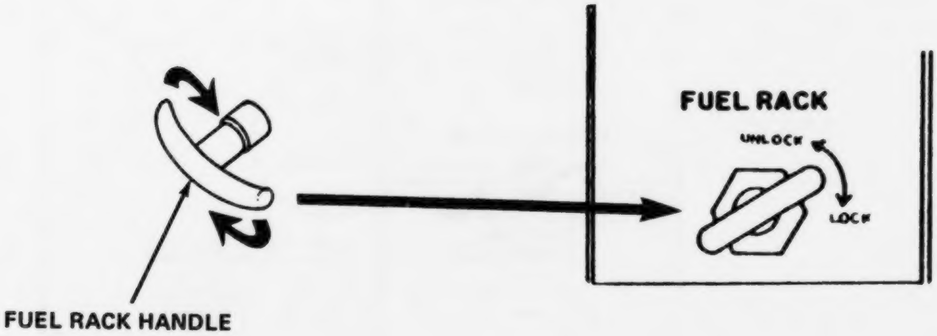

ENGINE SWITCH
RUN
OFF
START
MODE SWITCH
MODE SWITCH
MANUAL THROTTLE
PRESSURE REGULATOR NORMAL
MANUAL THROTTLE

7 Pull out MODE SWITCH and push right to PRESSURE REGULATOR (NORMAL) position.

2-13. OPERATION OF LEAD PUMPING STATION (CONT)

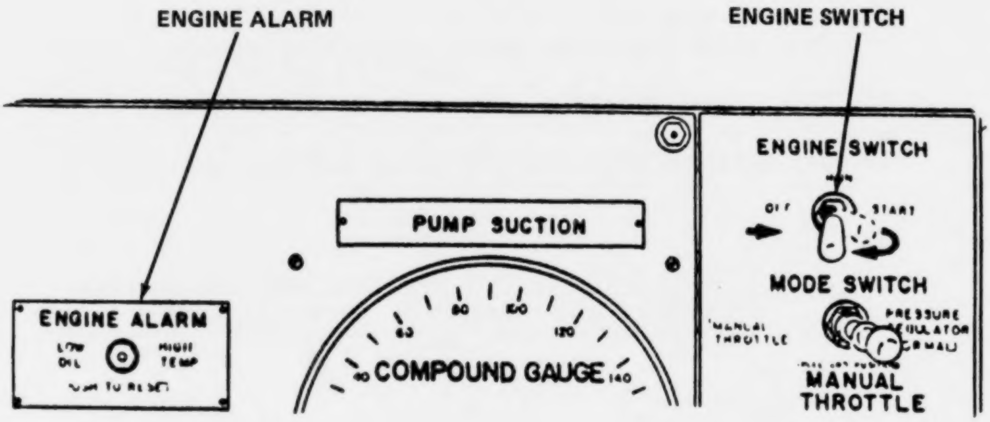

ENGINE SWITCH
START
MODE SWITCH
PRESSURE
MANUAL THROTTLE
MANUAL THROTTLE

8 Turn MANUAL THROTTLE right until it is fully in.


FUEL RACK
UNLOCK
LOCK
FUEL RACK HANDLE

9 Turn FUEL RACK handle left to UNLOCK position. Push handle fully in and turn right to LOCK position.

2-13. OPERATION OF LEAD PUMPING STATION (CONT)


ENGINE ALARM
ENGINE SWITCH
ENGINE ALARM
LOW OIL
HIGH TEMP
PUSH TO RESET
PUMP SUCTION
COMPOUND GAUGE
40
60
80
100
120
140
ENGINE SWITCH
OFF
START
MODE SWITCH
MANUAL THROTTLE
PRESSURE REGULATOR
MANUAL THROTTLE

WARNING

- DO NOT operate engine around open fuel. Fuel presents an extreme explosion and fire hazard. Make sure fuel lines are securely connected and free of leaks. Never refuel hot or running engine. Avoid overfilling fuel tank. Always use correct type of fuel.
- Hearing protection must be worn by personnel standing within 50 ft of operating pump unit.

CAUTION

To prevent damage to starter, allow 3 minutes between start attempts.

NOTE

Engine alarm will sound if engine does not start within 30 seconds after ENGINE SWITCH is set to START position.

10 Push ENGINE SWITCH right to START position and hold until engine starts. When engine starts, release ENGINE SWITCH. Engine will run at idle speed (1000 rpm). If alarm sounds:

(a) Set ENGINE SWITCH at OFF position.

2-13. OPERATION OF LEAD PUMPING STATION (CONT)

(b) Push ENGINE ALARM reset button.

(c) Allow 3 minutes before restarting engine.

11 Turn MANUAL THROTTLE left until it is fully out.

12 Set PRESSURE REGULATOR SWITCH to ELECTRIC position.

WARNING

If pump fails to take suction, pump can overheat. Overheated pumps can cause severe burns and injury.

NOTE

Suction is indicated by pressure reading on PUMP DISCHARGE gage or by a decrease in engine speed.

13 Increase engine speed by turning ELECTRIC SPEED CONTROL right until pump takes suction. If pump fails to take suction after 3 minutes or overheats, shut down engine (step 18). Check suction line for leaks or blockage.

CAUTION

If suction pressure falls below 10 psi or if discharge pressure rises above 150 psi, damage can result to pump.

NOTE

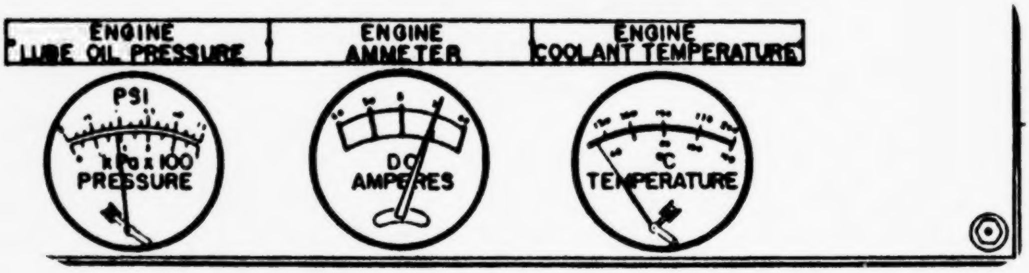
Suction and discharge pressures will vary depending on operating conditions and engine speed.

14 When pump is operated in electric manual mode, monitor suction and discharge pressures. If suction pressure falls below 10 psi or if discharge pressure rises above 150 psi, reduce engine speed to regain proper pressure. If needed, cut back to idle until problem is corrected.

2-13. OPERATION OF LEAD PUMPING STATION (CONT)

15 Use ELECTRIC SPEED CONTROL to adjust engine speed. Turn right to increase speed. Turn left to decrease speed.

16 Perform during (D) PMCS.


ENGINE LUBE OIL PRESSURE
ENGINE AMMETER
ENGINE COOLANT TEMPERATURE
PSI
kPa x 100
PRESSURE
DC AMPERES
°C
TEMPERATURE

NOTE

Engine alarm will sound if engine operating temperature goes above 220°F (104°C) or oil pressure falls below 10 psi (69 kPa).

17 If engine alarm sounds:

(a) Check ENGINE COOLANT TEMPERATURE gage and ENGINE LUBE OIL PRESSURE gage.

(b) If engine temperature or oil pressure is not within proper limits, shut down engine (step 18).

(c) Push ENGINE ALARM reset button.

(d) Notify organizational maintenance.

2-13. OPERATION OF LEAD PUMPING STATION (CONT)

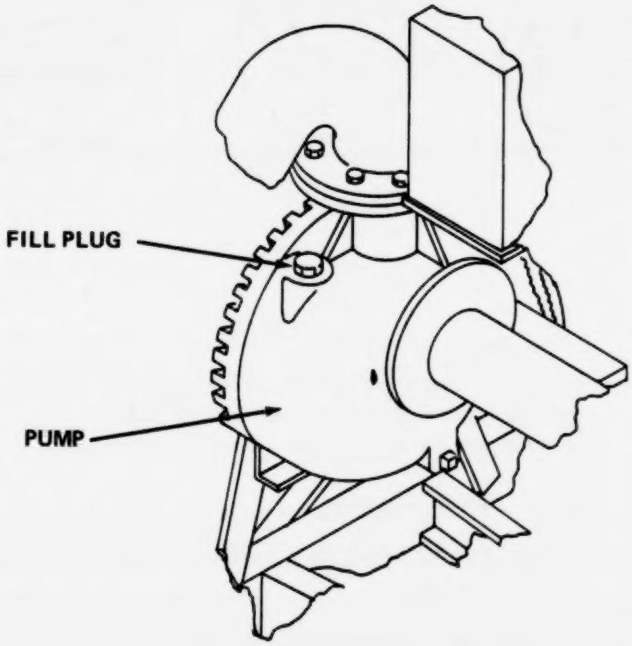
CAUTION

To prevent damage to engine, DO NOT shut engine down suddenly from full-load running. Let engine idle for a few minutes to allow for temperature balance.

18 To stop engine, set ELECTRIC SPEED CONTROL left to IDLE position. Let engine idle for 2 or 3 minutes. Push ENGINE SWITCH left to OFF position. Engine will shut down.

c. Electric Manual Mode: US636HCCD-1

1 Perform before (B) PMCS.



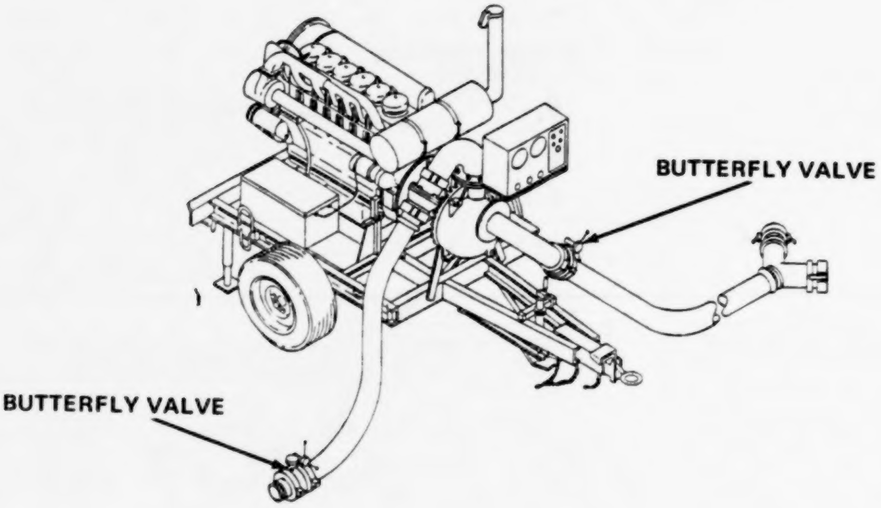
CAUTION

DO NOT operate pump unless casing is filled to bottom of fill plug hole. Operating a dry pump will cause overheating and damage unit.

2 Remove fill plug at top of pump.

3 Fill pump casing with water to bottom of fill plug hole. Reinstall plug tightly.

2-13. OPERATION OF LEAD PUMPING STATION (CONT)

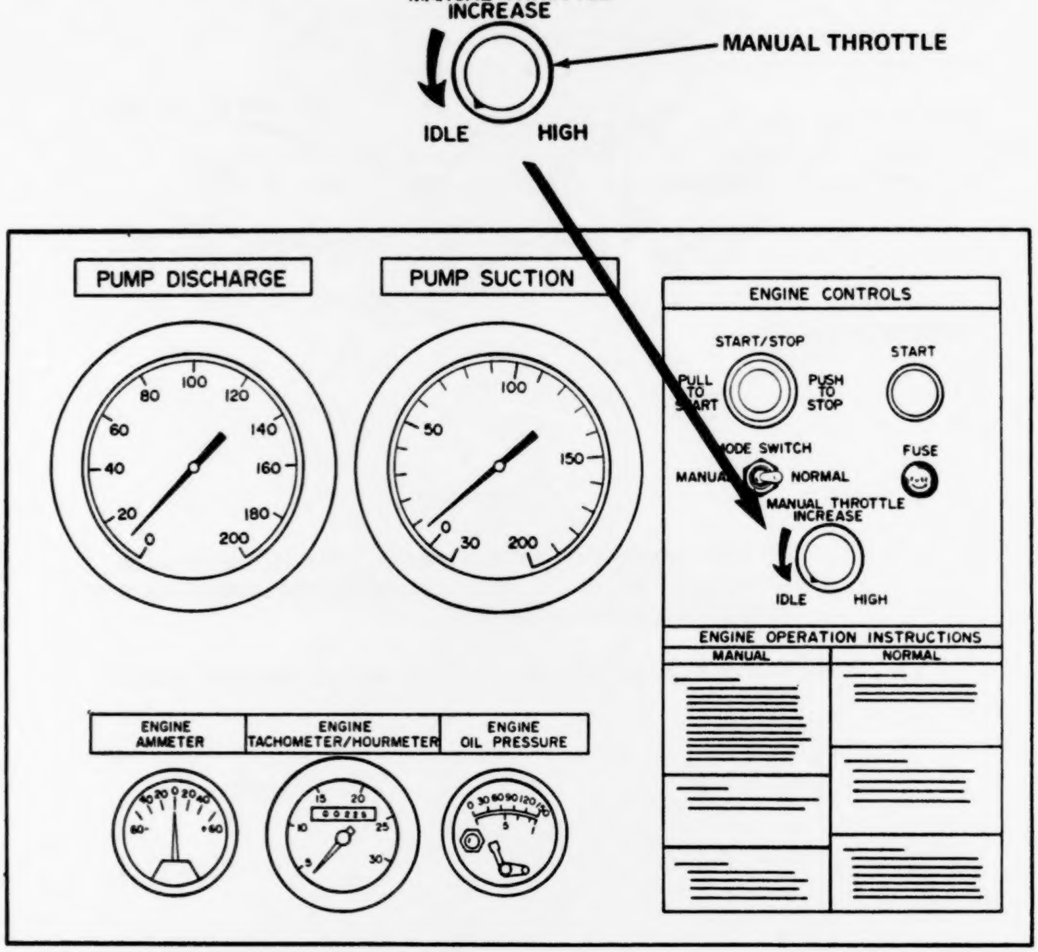

BUTTERFLY VALVE
BUTTERFLY VALVE

CAUTION

DO NOT operate pump against a closed suction or discharge valve. This can cause overheating and damage to pump unit.

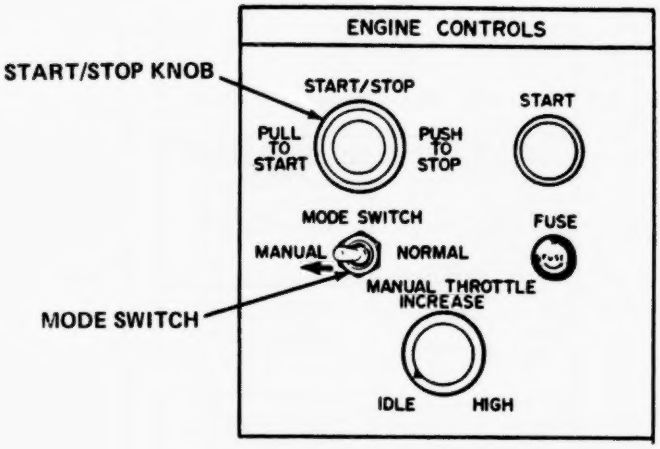
4 Open butterfly valves on suction and discharge lines.

2-13. OPERATION OF LEAD PUMPING STATION (CONT)


MANUAL THROTTLE INCREASE
MANUAL THROTTLE
IDLE
HIGH
PUMP DISCHARGE
0
20
40
60
80
100
120
140
160
180
200
PUMP SUCTION
0
30
50
100
150
200
ENGINE CONTROLS
START/STOP
PULL TO START
PUSH TO STOP
START
MODE SWITCH
MANUAL
NORMAL
FUSE
MANUAL THROTTLE INCREASE
IDLE
HIGH
ENGINE OPERATION INSTRUCTIONS
MANUAL
NORMAL
ENGINE AMMETER
ENGINE TACHOMETER/HOURMETER
ENGINE OIL PRESSURE

5 Turn MANUAL THROTTLE INCREASE knob left to IDLE position.

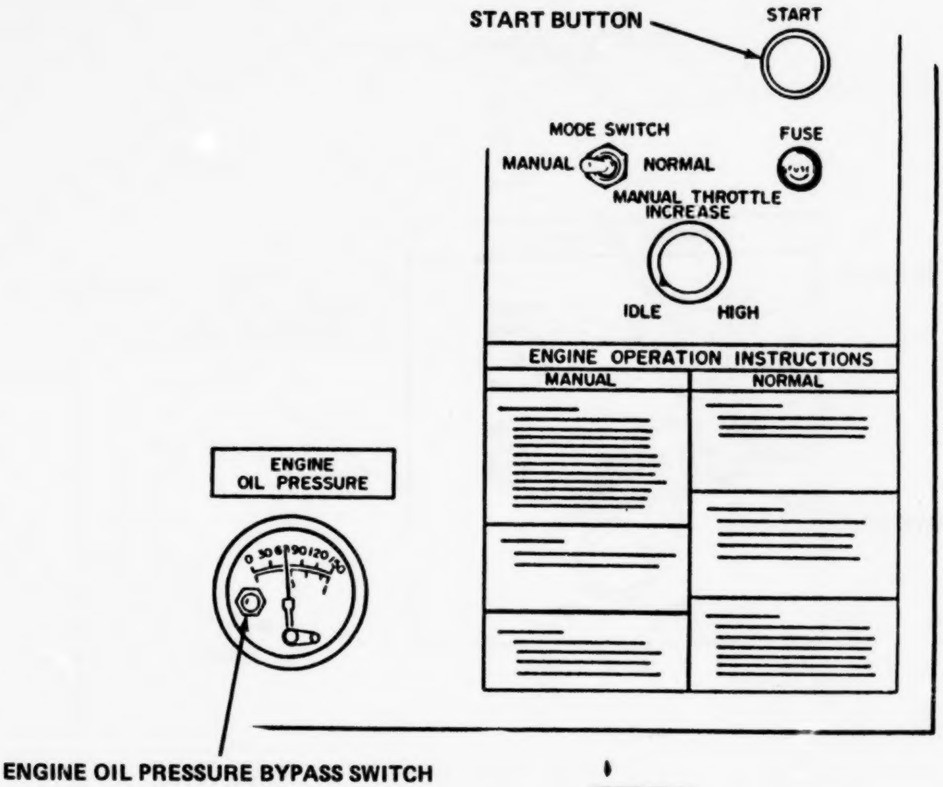
2-13. OPERATION OF LEAD PUMPING STATION (CONT)


ENGINE CONTROLS
START/STOP KNOB
START/STOP
PULL TO START
PUSH TO STOP
START
MODE SWITCH
FUSE
MANUAL
NORMAL
MANUAL THROTTLE
INCREASE
MODE SWITCH
IDLE
HIGH

6 Set MODE SWITCH to MANUAL position.

7 Pull out START/STOP knob.

2-13. OPERATION OF LEAD PUMPING STATION (CONT)


START BUTTON
START
MODE SWITCH
FUSE
MANUAL
NORMAL
MANUAL THROTTLE
INCREASE
IDLE
HIGH
ENGINE OPERATION INSTRUCTIONS
MANUAL
NORMAL
ENGINE
OIL PRESSURE
0 30 60 90 120 150
ENGINE OIL PRESSURE BYPASS SWITCH

WARNING

- DO NOT operate engine around open fuel. Fuel presents an extreme explosion and fire hazard. Make sure fuel lines are securely connected and free of leaks. Never refuel hot or running engine. Avoid overfilling fuel tank. Always use correct type of fuel.
- Hearing protection must be worn by personnel standing within 50 ft of operating pump units.

CAUTION

To prevent damage to starter, DO NOT leave starter running for more than 10 seconds. Allow 3 minutes between start attempts.

8 Push in START button and engine oil pressure bypass switch at same time. When engine starts, release START button.

2-13. OPERATION OF LEAD PUMPING STATION (CONT)

NOTE

Engine should shut down when engine oil pressure bypass switch is released if pressure is not up to 10 psi.

9 Check engine oil pressure gage. When gage shows 40 psi, release engine oil pressure bypass switch.

WARNING

Never tamper with governor to gain more power. Governor is set at 2500 rpm full load to establish safe operating limits that should not be exceeded.

CAUTION

If pump fails to take suction, pump can overheat. Overheated pumps can cause severe burns and injury.

NOTE

Suction is indicated by pressure reading on PUMP DISCHARGE gage or by a decrease in engine speed.

10 Turn MANUAL THROTTLE INCREASE knob right until pump takes suction. If pump fails to take suction after 3 minutes or overheats, shut down engine (step 15).

CAUTION

If suction pressure falls below 10 psi or if discharge pressure rises above 150 psi, damage can result to pump.

NOTE

Suction and discharge pressures will vary depending on operating conditions and engine speed.

11 Use MANUAL THROTTLE INCREASE knob to adjust engine speed. Turn left to decrease speed. Turn right to increase speed.

12 When pump is operated in electric manual mode, monitor suction and discharge pressures. If suction pressure falls below 10 psi or if discharge pressure rises above 150 psi, reduce engine speed to regain proper pressure. If needed, cut back to idle until problem is corrected.

2-13. OPERATION OF LEAD PUMPING STATION (CONT)

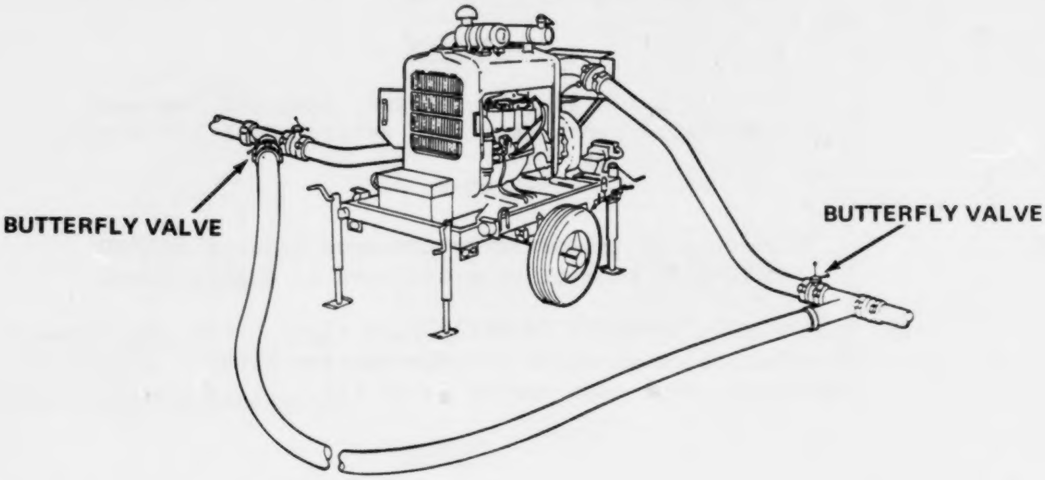
13 Perform during (D) PMCS.

CAUTION

To prevent damage to engine, DO NOT shut engine down suddenly from full-load running. Let engine idle for a few minutes to allow for temperature balance.

14 To stop engine, turn MANUAL THROTTLE INCREASE knob left to IDLE position. Let engine idle for 2 or 3 minutes. Push in START/STOP knob. Engine will shut down.

2-14. OPERATION OF BOOST PUMPING STATIONS

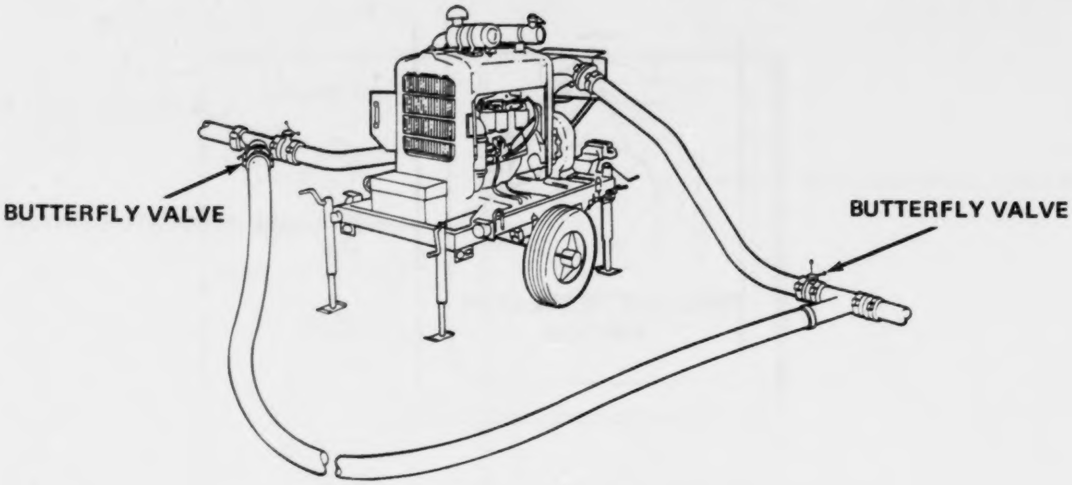


a. Manual Mode: Unit 609

1 Close butterfly valve to bypass hose.

2 Perform steps 1 thru 14 of paragraph 2-13a.

2-14. OPERATION OF BOOST PUMPING STATIONS (CONT)



b. Electric Manual Mode: Unit 609

1 Close butterfly valve to bypass hose.

2 Perform steps 1 thru 18 of paragraph 2-13b.

c. Electric Automatic Mode: Unit 609

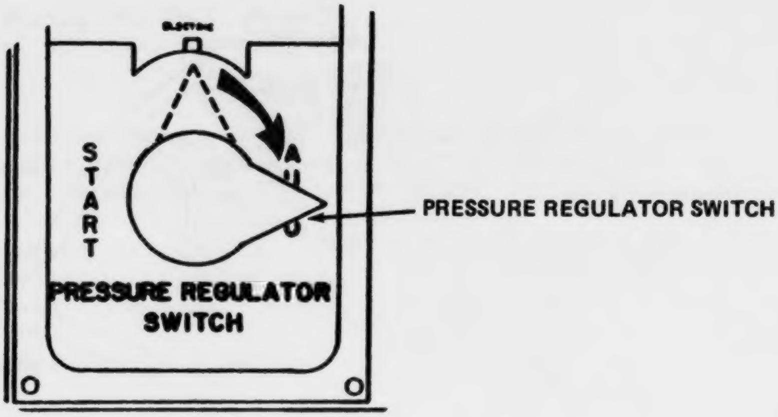
CAUTION

During startup, all pumps should be operated in manual or electric manual modes.

1 Close butterfly valve to bypass line.

2 Perform steps 1 thru 13 of paragraph 2-13b.

2-14. **OPERATION OF BOOST PUMPING STATIONS** (CONT)



3 Turn PRESSURE REGULATOR SWITCH right to AUTO position. Engine speed is now automatically controlled by the pressure regulator. The regulator provides 150 psi discharge pressure at suction pressures of 20 to 120 psi.

4 Perform during (D) PMCS.

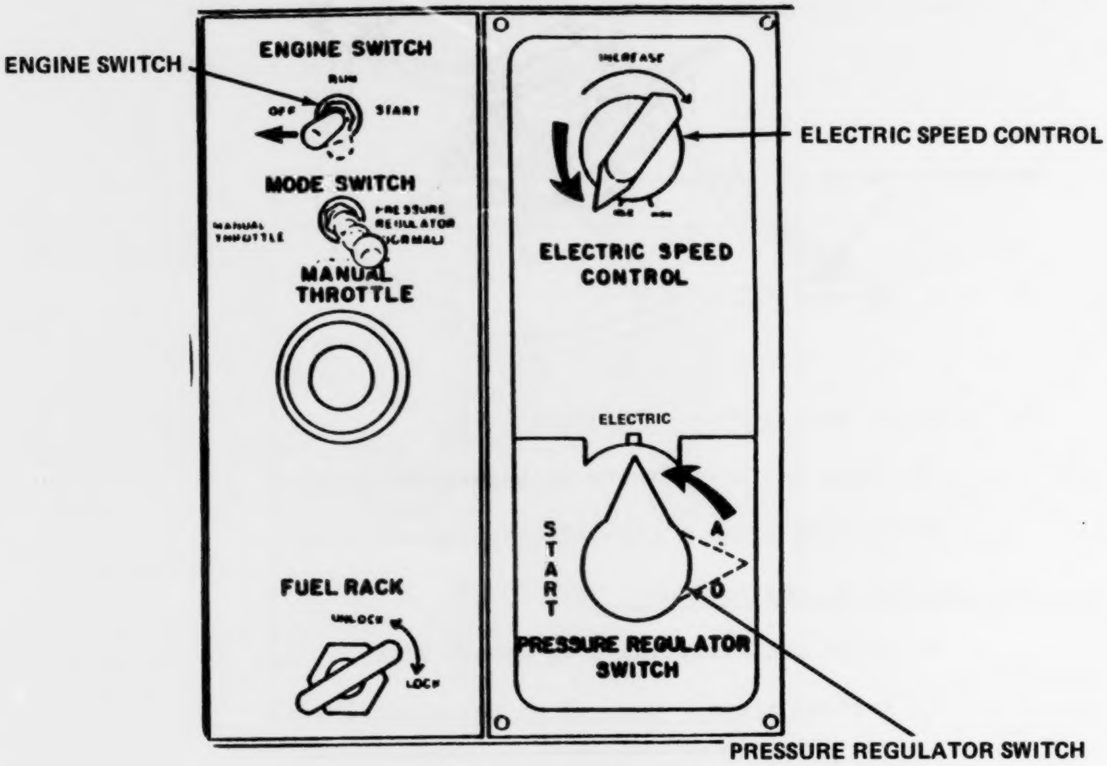
NOTE

> Engine alarm will sound if engine operating temperature goes above 220°F (104°C) or oil pressure falls below 10 psi (69 kPa).

5 If engine alarm sounds:

- (a) Check ENGINE COOLANT TEMPERATURE gage and ENGINE LUBE OIL PRESSURE gage.
- (b) If engine temperature or oil pressure is not within proper limits, shut down engine (step 6).
- (c) Push ENGINE ALARM reset button.
- (d) Notify organizational maintenance.

2-14. OPERATION OF BOOST PUMPING STATIONS (CONT)

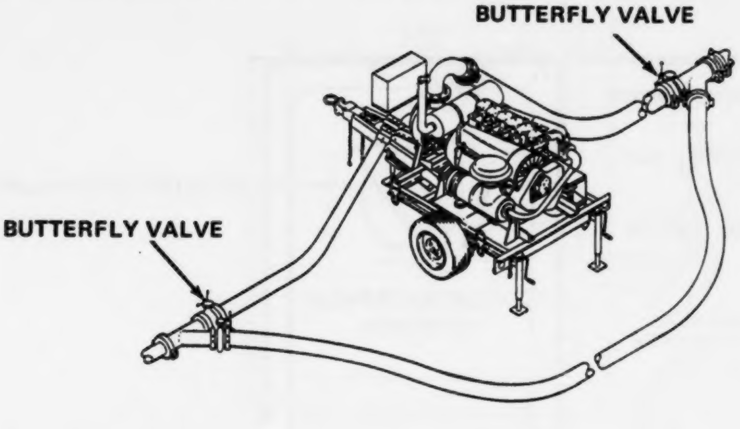

ENGINE SWITCH
ENGINE SWITCH
RUN
OFF
START
MODE SWITCH
MANUAL THROTTLE
PRESSURE REGULATOR (NORMAL)
MANUAL THROTTLE
FUEL RACK
UNLOCK
LOCK
INCREASE
ELECTRIC SPEED CONTROL
ELECTRIC SPEED CONTROL
ELECTRIC
START
A
D
PRESSURE REGULATOR SWITCH
PRESSURE REGULATOR SWITCH

CAUTION

To prevent damage to engine, DO NOT shut engine down suddenly from full-load running. Let engine idle for a few minutes to allow for temperature balance.

6 To stop engine, turn ELECTRIC SPEED CONTROL left to IDLE position. Let engine idle 2 or 3 minutes. Turn PRESSURE REGULATOR SWITCH left to ELECTRIC position. Push ENGINE SWITCH left to OFF position.

2-14. OPERATION OF BOOST PUMPING STATIONS (CONT)


BUTTERFLY VALVE
BUTTERFLY VALVE

d. Electric Manual Mode: US63HCCD-1

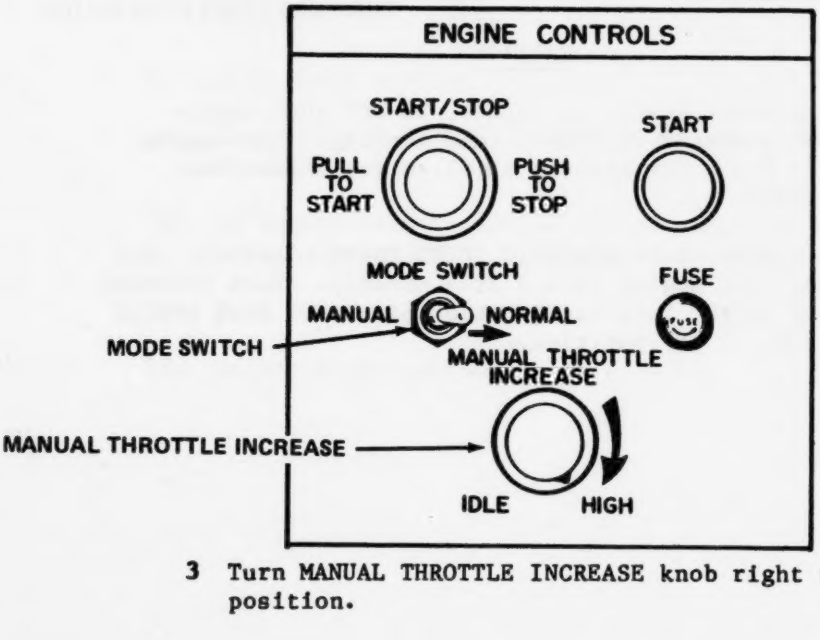
1 Close butterfly valve in bypass line.

2 Perform steps 1 thru 15 of paragraph 2-13c.

e. Electric Automatic Mode: US636HCCD-1

1 Close butterfly valve in bypass line.

2 Perform steps 1 thru 13 of paragraph 2-13c.

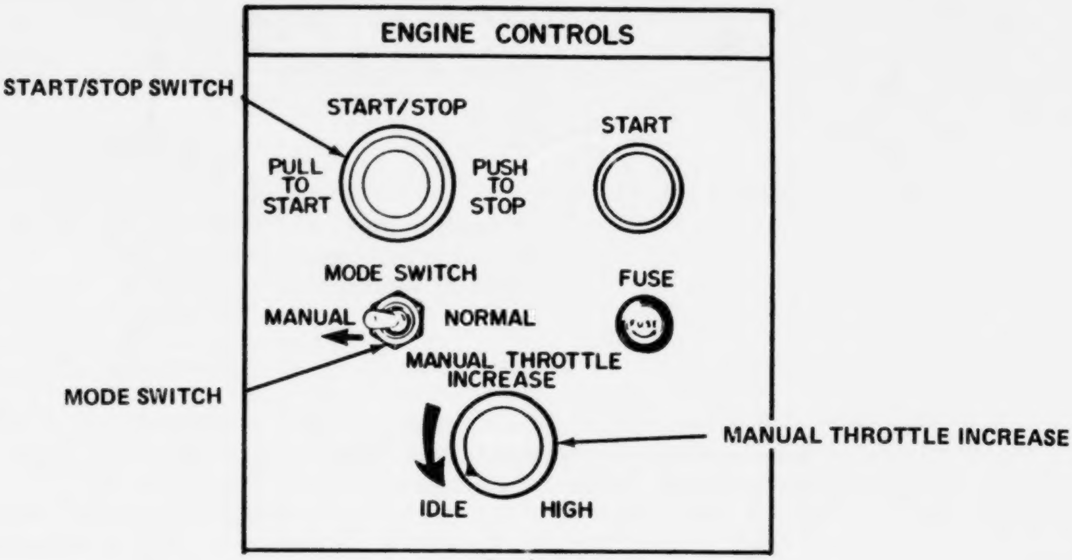

ENGINE CONTROLS
START/STOP
PULL TO START
PUSH TO STOP
START
MODE SWITCH
MANUAL
NORMAL
FUSE
MODE SWITCH
MANUAL THROTTLE INCREASE
MANUAL THROTTLE INCREASE
IDLE
HIGH

3 Turn MANUAL THROTTLE INCREASE knob right to HIGH position.

2-14. OPERATION OF BOOST PUMPING STATIONS (CONT)

4 Push MODE SWITCH right to NORMAL position. Engine speed will adjust automatically to changes in pressure rates.

5 Perform during (D) PMCS.


ENGINE CONTROLS
START/STOP SWITCH
START/STOP
PULL TO START
PUSH TO STOP
START
MODE SWITCH
FUSE
MANUAL
NORMAL
MANUAL THROTTLE INCREASE
MODE SWITCH
MANUAL THROTTLE INCREASE
IDLE
HIGH

CAUTION

To prevent damage to engine, DO NOT shut engine down suddenly from full-load running. Let engine idle for a few minutes to allow for temperature balance.

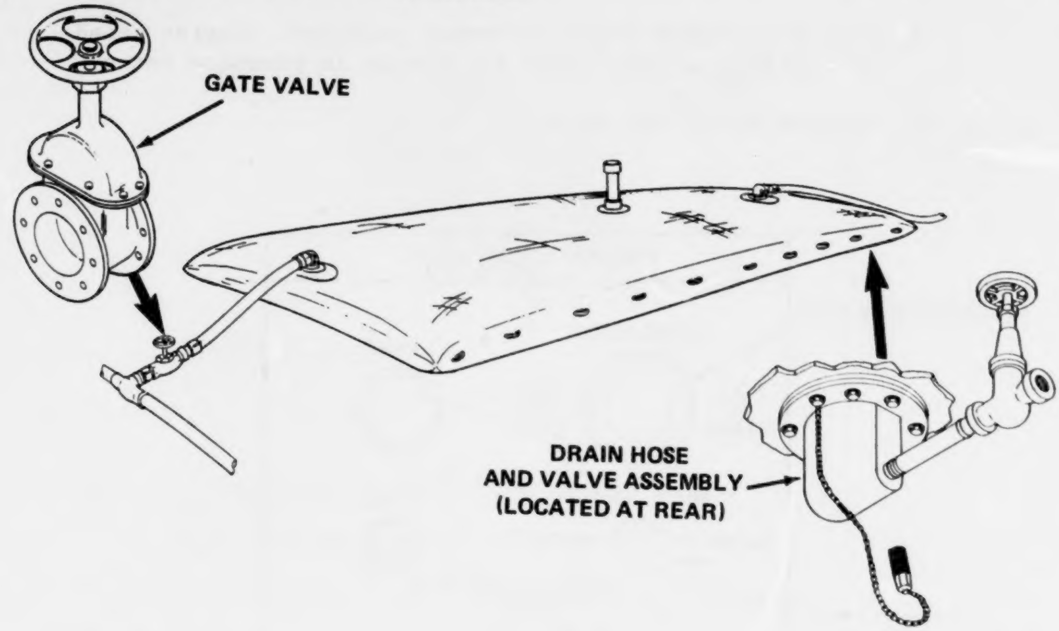
6 To stop engine:

(a) Turn MANUAL THROTTLE INCREASE knob left to IDLE position. Push MODE SWITCH left to MANUAL position.

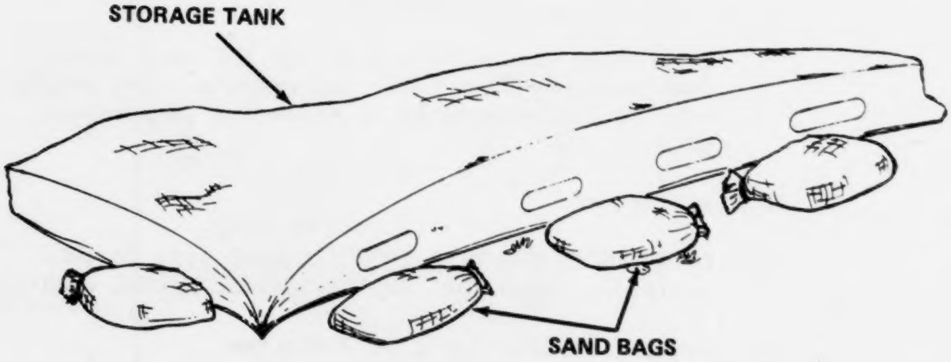
(b) Let engine idle for 2 or 3 minutes.

(c) Push in START/STOP switch. Engine will shut down.

2-15. OPERATION OF STORAGE ASSEMBLIES


GATE VALVE
DRAIN HOSE
AND VALVE ASSEMBLY
(LOCATED AT REAR)

1 Open gate valve on reducing tee to fill tank. Check to see that drain valve on tank is closed.


STORAGE TANK
SAND BAGS

2 If storage tank rolls when being filled, place sandbags along edge of tank to prevent further rolling.

2-15. OPERATION OF STORAGE ASSEMBLIES (CONT)

3 Whenever a storage tank is being filled, inform operators at downline pumping stations to expect reduction in hoseline pressure. The reduction in pressure may cause engines on downline stations to reduce speed. Whenever possible, do not fill tank(s) at a rate that causes downline pumping stations to reduce speed.

4 When storage tank is full, close gate valve.

2-16. OPERATION OF DISTRIBUTION POINTS

a. General

(1) Before placing distribution point in operation, determine proper strength of hypochlorite solution (para 2-16c).

(2) After solution strength has been determined, start 125 gpm pump. Prepare solution and place hypochlorination unit into operation (para 2-16d or 2-16e). When unit has been adjusted, open gate valves in hoseline network. Water may now be distributed at manual disbursing stations.

(3) When distribution point is not being used, shut down 125 gpm pump. Hypochlorination unit will stop automatically. Make sure nozzles and elbow valves are hanging from nozzle stand assemblies. If distribution point will not be used for a long period, place dust plugs on elbow valves and nozzles.

(4) If hypochlorination unit stops working properly or residual test does not give satisfactory reading, immediately shut down operation of distribution point. Notify other operators and take corrective action.

b. 125 GPM Pump. To operate 125 gpm pump under usual conditions, see TM 5-4320-208-12&P, chapter 2, section IV.

c. Determining Hypochlorite Solution Strength

NOTE

> Do not confuse the terms "dosage" and "residual." Dosage refers to amount of cholorine added to the water. Residual refers to amount of chlorine remaining in the water after 10 minutes.

1 Determine desired chlorine dosage or solution strength.

2 Check listing on table 2-2. Read across for required quantity of calcium hypochlorite powder needed.

2-16. OPERATION OF DISTRIBUTION POINTS (CONT)

3 If chlorine requirement is unknown, start with a 1.0 percent solution strength. Adjust in accordance with chlorine residual tests.

Table 2-2. Hypochlorite Solution Strength Index*

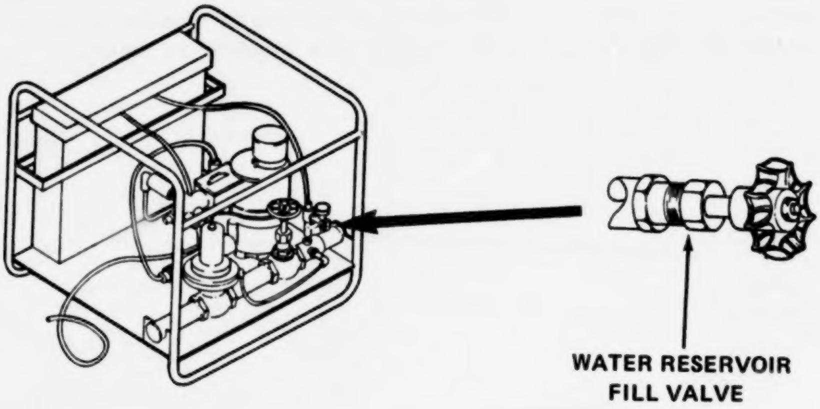
DOSAGE	SOLUTION STRENGTH	REQUIRED QUANTITY OF CALCIUM HYPOCHLORITE
0.25 ppm	0.05%	0.5 oz
0.5 ppm	0.10%	1.0 oz
0.75 ppm	0.20%	2.0 oz
1.0 ppm	0.25%	2.5 oz
1.5 ppm	0.375%	3.75 oz
2.0 ppm	0.475%	4.75 oz
2.5 ppm	0.6%	6.0 oz
3.0 ppm	0.725%	7.25 oz
3.5 ppm	0.825%	8.25 oz
4.0 ppm	0.95%	9.5 oz
5.0 ppm	1.0%	10.0 oz
10.0 ppm	2.5%	25.0 oz
15.0 ppm	3.5%	35.0 oz
20.0 ppm	4.75%	47.5 oz
25.0 ppm	6.0%	60.0 oz

*Figures in table 2-2 are based on following:

Model 1955-1: 100 gpm maximum flow rate through unit at 24 spm with 50 percent stroke setting

Model A-506131: 100 gpm maximum flow rate through unit at 12 spm with 100 percent stroke setting

2-16. OPERATION OF DISTRIBUTION POINTS (CONT)



d. Operation of Hypochlorination Unit: 1955-1

WARNING

To keep dirt, sand, and grit from contaminating the solution, make sure reservoir is covered by lid.

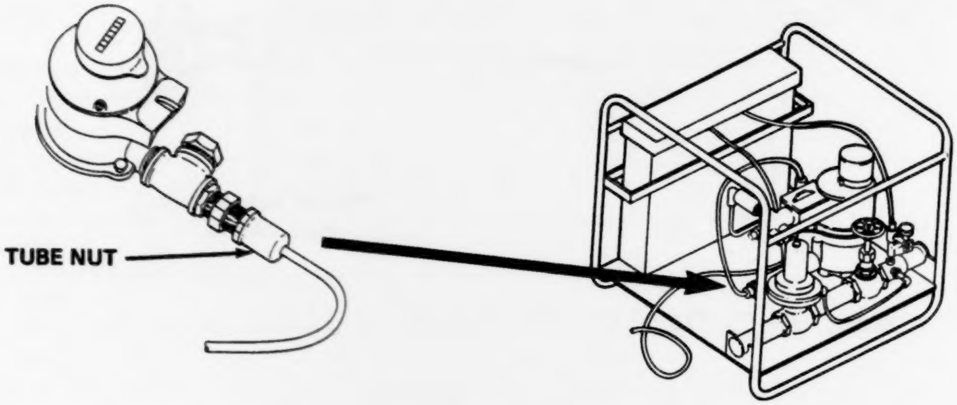
1 Open WATER RESERVOIR FILL VALVE and fill reservoir. Close valve when water reaches FULL mark on reservoir.

WARNING

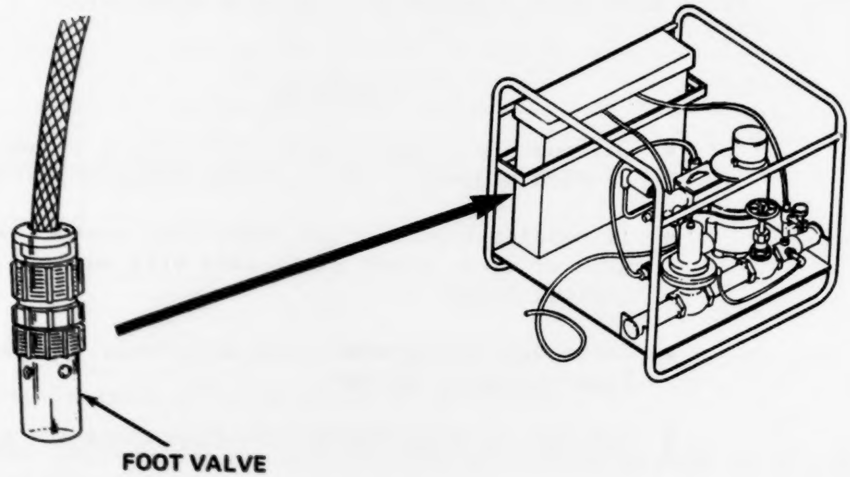
- Calcium hypochlorite can cause injury if not handled properly. Heed safety measures below.
- If calcium hypochlorite comes into contact with skin or eyes, flush right away with water. Seek medical help.
- Store calcium hypochlorite in a cool, dry place. Keep container closed.
- Mix only in accordance with directions for use.
- DO NOT allow calcium hypochlorite to mix with any other materials, such as fuels, oils, paint products, or ammonia. This may cause fire or hazardous gases.

2-16. OPERATION OF DISTRIBUTION POINTS (CONT)

2 Add required amount of calcium hypochlorite powder (item 3, appendix D) for desired solution strength (table 2-2) to solution reservoir. Thoroughly mix powder in water.



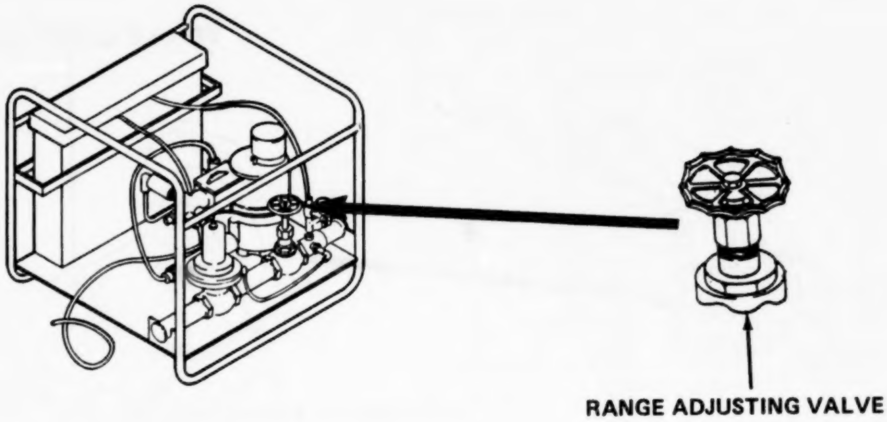
3 Loosen tube nut at injection point.



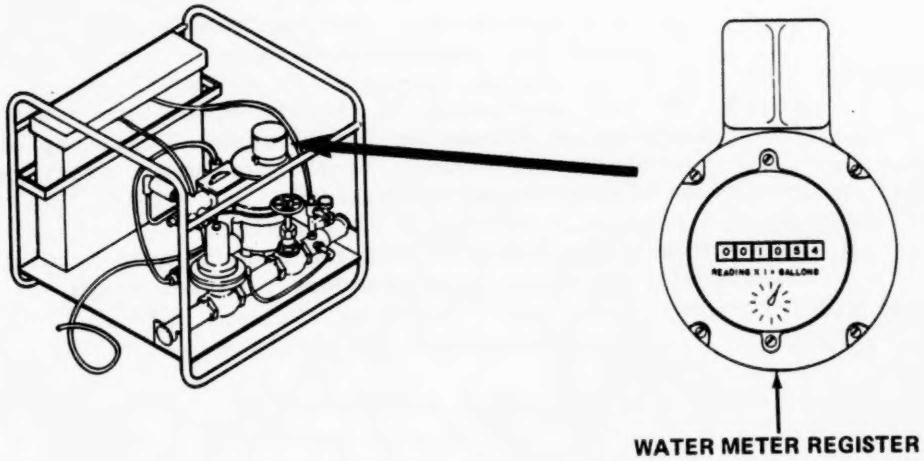
4 Insert foot valve into solution. Rapidly move foot valve up and down several times to fill suction line.

5 Tighten tube nut at injection point.

2-16. OPERATION OF DISTRIBUTION POINTS (CONT)

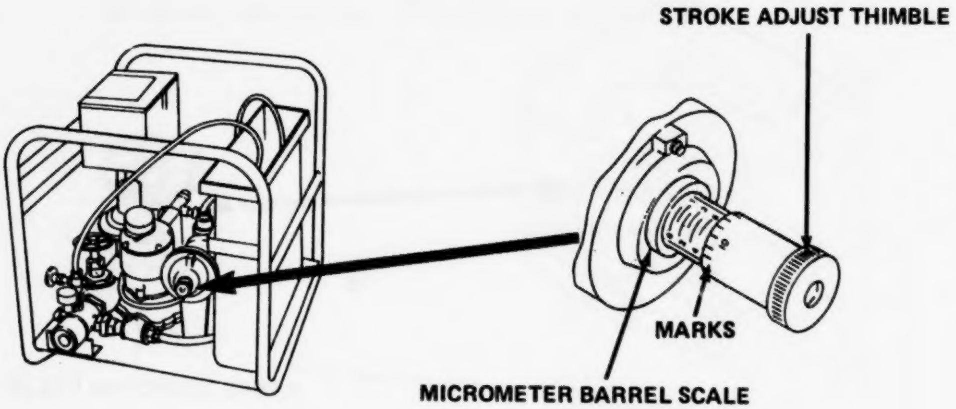

RANGE ADJUSTING VALVE

6 Open range adjusting valve.


WATER METER REGISTER

7 When flow rate is at maximum, close valve slowly until water meter register indicates flow rate of 14 gpm.

2-16. OPERATION OF DISTRIBUTION POINTS (CONT)



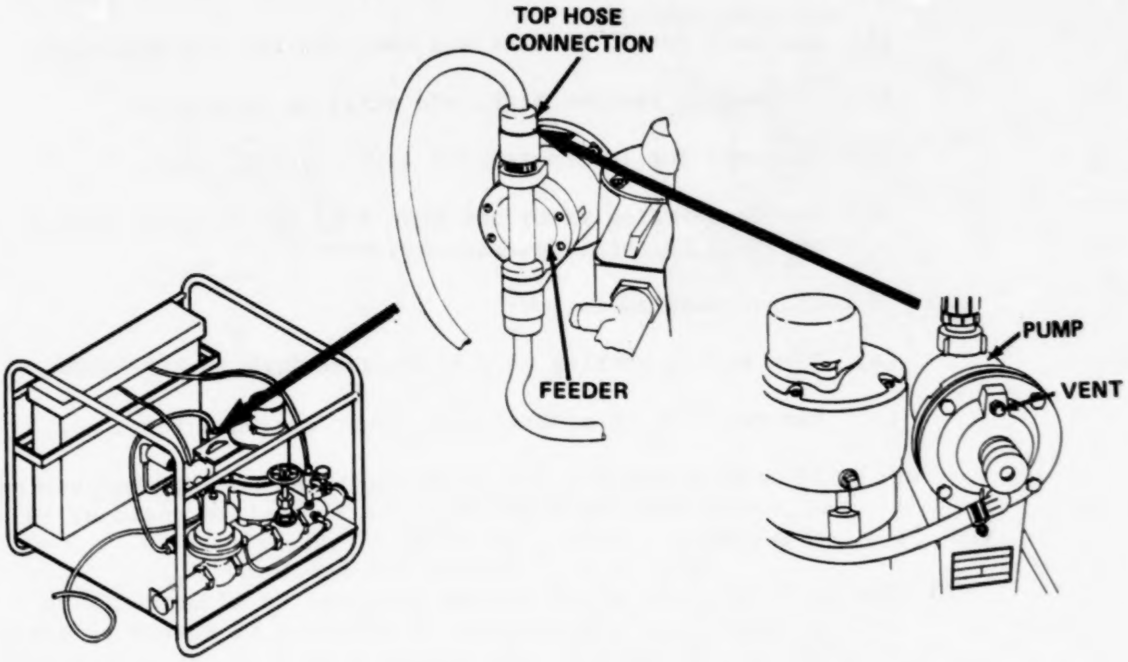
NOTE

- Stroke adjust thimble is marked to measure revolutions. Turning thimble from 0 to 10 equals one half revolution. Turning thimble from 0 to 20 equals one complete revolution.

- One half revolution of thimble equals one number setting on micrometer barrel scale. One complete revolution of thimble equals two number settings on micrometer barrel scale.

8 Turn stroke adjust thimble left two and one half revolutions. Thimble will be set at 5 on micrometer barrel scale.

2-16. OPERATION OF DISTRIBUTION POINTS (CONT)



9 If hypochlorite feeder becomes air-bound after startup:

  (a) Loosen top hose connection on feeder.

  (b) Set stroke adjust thimble at 10 on micrometer barrel scale. This allows air to escape through small vent in top of pump.

  (c) When air is vented, set stroke adjust thimble back to 5 on micrometer barrel scale.

  (d) Tighten top hose connection on feeder.

NOTE

Area medical officer should prescribe desired chlorine residual.

10 After unit operates for 10 minutes, take chlorine residual test (para 2-16f).

11 If residual reading is high:

2-16. OPERATION OF DISTRIBUTION POINTS (CONT)

(a) Turn stroke setting to 2.5 on micrometer barrel scale.

(b) Run unit for 10 minutes and take another residual test.

(c) If reading remains high, add water to reservoir.

(d) Run unit for 10 minutes and take residual test.

(e) Continue adding water and repeating tests until desired residual is obtained.

12 If residual reading is low:

(a) Turn stroke setting to 7.5 on micrometer barrel scale.

(b) Run unit for 10 minutes and repeat residual test.

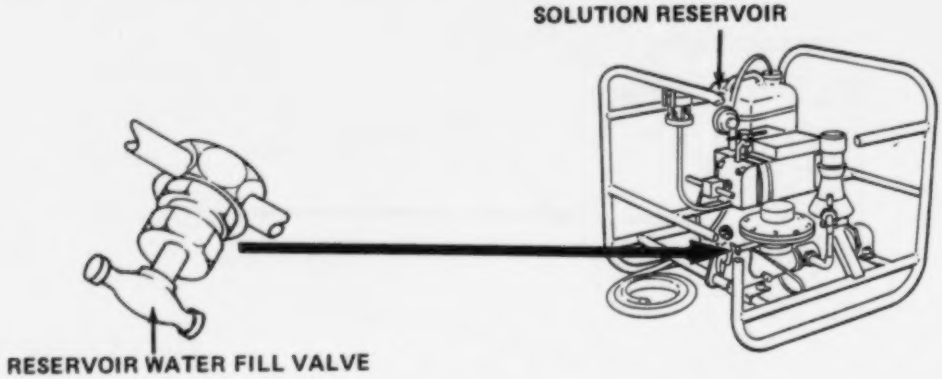
(c) If reading remains low, continue to adjust stroke setting up and perform residual tests until desired residual is obtained.

13 When residual test gives desired reading, no adjustments to unit are required. Check level of solution in reservoir every 30 minutes. When level drops within 2 or 3 in. of foot valve, prepare new batch of solution in reservoir.

14 Make residual tests at frequent intervals to see if desired residual is being maintained. Over an extended period of time, unit may require some adjustment to keep residual at desired level.

15 To stop unit, close range adjusting valve. Pump will not operate when there is no flow through water meter.

2-16. OPERATION OF DISTRIBUTION POINTS (CONT)



e. Operation of Hypochlorination Unit: A-506131

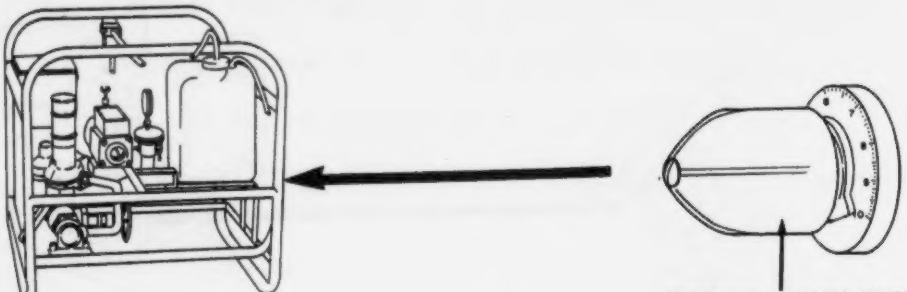
1 Open RESERVOIR WATER FILL VALVE and fill reservoir. Close valve when water reaches 5 gal. mark.

WARNING

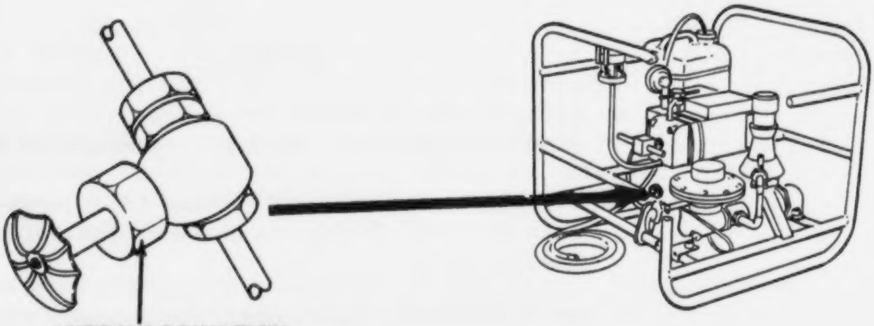
- Calcium hypochlorite can cause injury if not handled properly. Heed safety measures below.
- If calcium hypochlorite comes into contact with skin or eyes, flush right away with water. Seek medical help.
- Store calcium hypochlorite in a cool, dry place. Keep container closed.
- Mix only in accordance with directions for use.
- DO NOT allow calcium hypochlorite to mix with any other materials, such as fuels, oils, paint products, or ammonia. This may cause fire or hazardous gases.

2 Add required ounces of calcium hypochlorite powder (item 3, appendix D) for desired solution strength (table 2-2) to solution reservoir. Thoroughly mix powder in water.

2-16. OPERATION OF DISTRIBUTION POINTS (CONT)

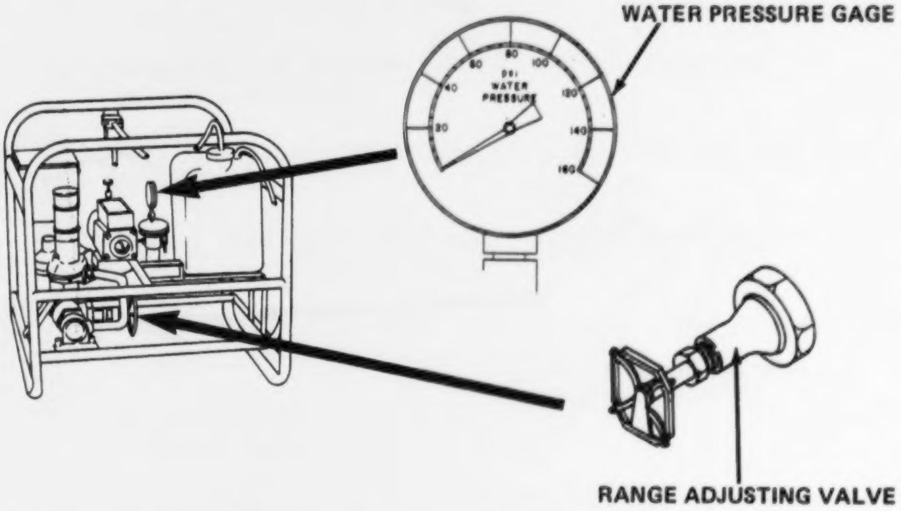

STROKE ADJUST KNOB

3 Turn STROKE ADJUST KNOB to 10 on dial.

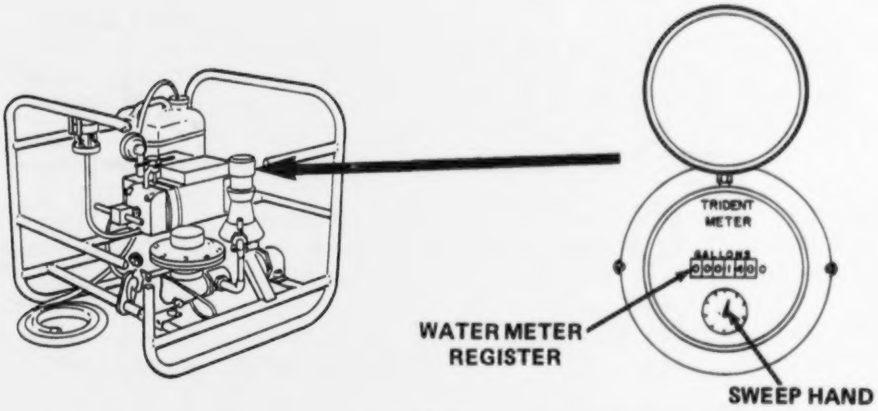

HYPOCHLORINATION
WATER VALVE

4 Open HYPOCHLORINATOR WATER VALVE.

2-16. OPERATION OF DISTRIBUTION POINTS (CONT)


WATER PRESSURE GAGE
PSI
WATER
PRESSURE
20
40
60
80
100
120
140
160
RANGE ADJUSTING VALVE

5 Open range adjusting valve. Check to see that water pressure gage registers at least 10 psi.

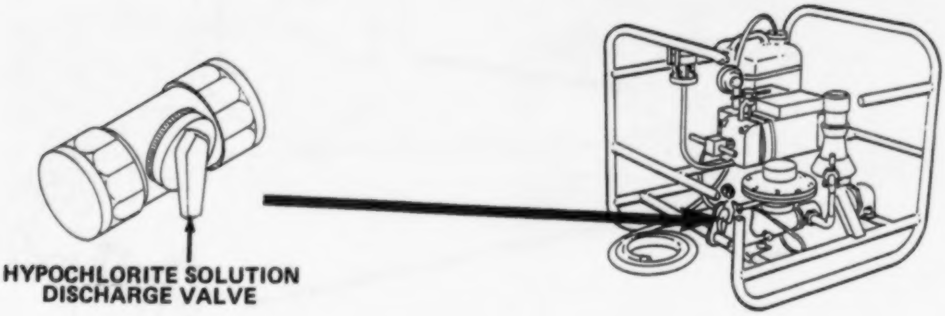

TRIDENT
METER
GALLONS
WATER METER
REGISTER
SWEEP HAND

NOTE

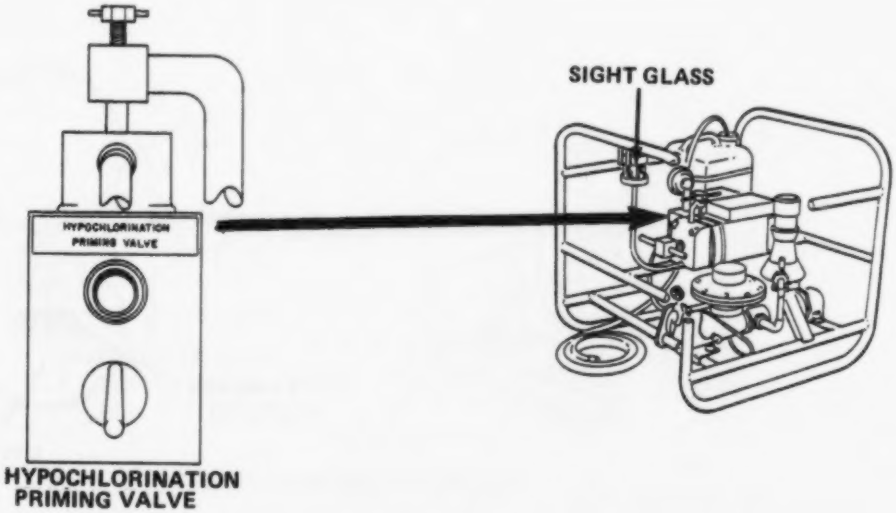
Sweep hand on water meter register makes one forward motion per stroke. Count forward motions made in 1 minute to determine stroke rate in spm.

6 Turn range adjusting valve so that hypochlorinator runs at 12 spm.

2-16. OPERATION OF DISTRIBUTION POINTS (CONT)


HYPOCHLORITE SOLUTION
DISCHARGE VALVE

7 Open HYPOCHLORITE SOLUTION DISCHARGE VALVE.


SIGHT GLASS
HYPOCHLORINATION PRIMING VALVE
HYPOCHLORINATION
PRIMING VALVE

8 Check sight glass to see that hypochlorinator is pumping solution. If solution is not being pumped, open HYPOCHLORINATION PRIMING VALVE to bleed air out of pump:

(a) Unscrew valve at start of pumping (forward) stroke.

(b) Tighten valve at start of suction (backward) stroke.

(c) If unit will not prime, check suction line and HYPOCHLORINATOR WATER VALVE for leakage.

2-16. OPERATION OF DISTRIBUTION POINTS (CONT)

NOTE

Area medical officer should prescribe desired chlorine residual.

9 After unit operates for 10 minutes, perform chlorine residual test (para 2-16f).

10 If residual reading is low, add powder to solution in reservoir. If reading is high:

(a) Set STROKE ADJUST KNOB to 8 on dial. Run unit for 10 minutes and take another residual test.

(b) If reading is still high, reduce setting to 6 and take residual test.

(c) If reading is still too high, add water to reservoir and repeat test.

(d) Continue adding water and repeating tests until desired reading is obtained. DO NOT REDUCE STROKE SETTING BELOW 6 ON DIAL.

11 When residual test gives desired reading, no adjustments to unit are required. Check level of solution in reservoir every 30 minutes. When level drops within 2 to 3 in. of strainer, stop unit operation, and prepare new batch of solution in reservoir.

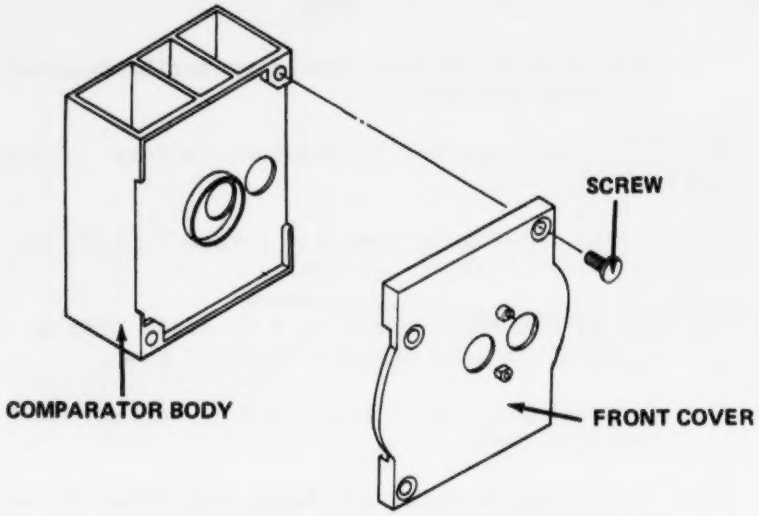
12 Make tests at frequent intervals to see if desired residual is being maintained. Over an extended period of time, unit may require some adjustment to keep residual at desired level.

13 To stop unit, fully close range adjusting valve. Shut off HYPOCHLORINATOR WATER VALVE.

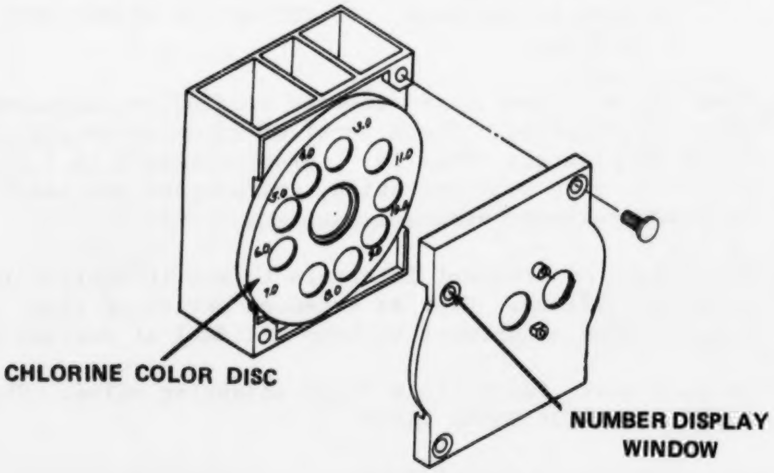
f. Performing Chlorine Residual Tests

1 Locate color comparator kit.

2-16. **OPERATION OF DISTRIBUTION POINTS** (CONT)


SCREW
COMPARATOR BODY
FRONT COVER

2 Remove two screws and cover from comparator body.

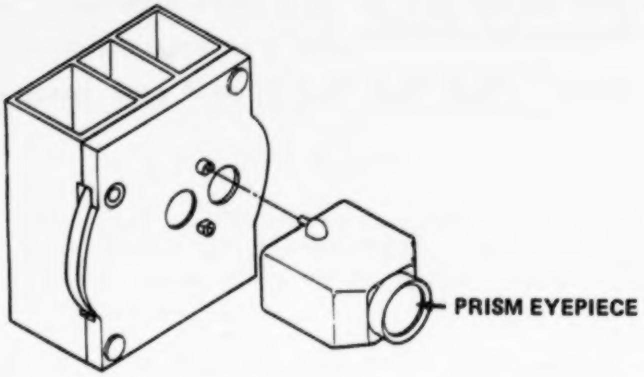

CHLORINE COLOR DISC
NUMBER DISPLAY WINDOW

CAUTION

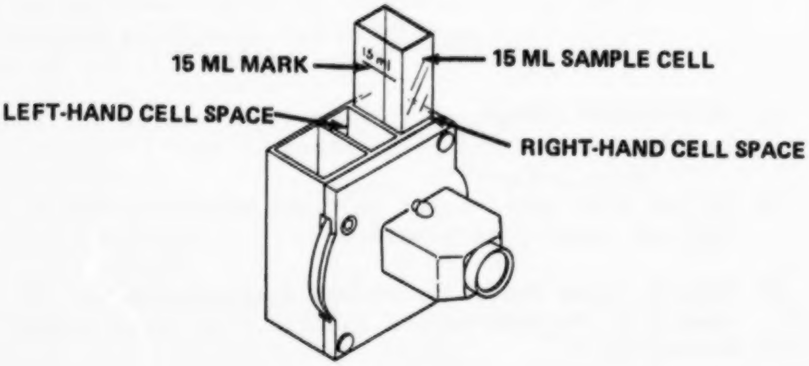
If wrong disc is used, chlorine residual test results will be incorrect. Make sure tag on disc reads either DPD CHLORINE or CHLORINE.

3 **Place chlorine color disc in comparator with numbers facing outward. Place front cover over disc. Ensure that number display window is at top of comparator. Install screws.**

2-16. OPERATION OF DISTRIBUTION POINTS (CONT)


PRISM EYEPIECE

4 Place prism eyepiece over sample cell windows on comparator.


15 ML MARK
15 ML SAMPLE CELL
LEFT-HAND CELL SPACE
RIGHT-HAND CELL SPACE
15 ml

5 Fill sample cell to 15 ml mark with water from manual disbursing station.

6 Insert this cell in right-hand cell space of comparator.

7 Fill second cell with water from manual disbursing station.

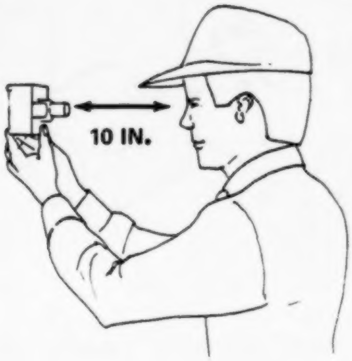
8 Rinse second cell and discard water, leaving enough to cover bottom of cell.

9 Add two no. 1 DPD tablets (item 12, appendix D) to second cell and crush with plastic rod.

2-16. OPERATION OF DISTRIBUTION POINTS (CONT)

10 Fill second cell to 15 ml mark with water from manual disbursing station.

11 Insert second cell in left-hand cell space of comparator.



CAUTION

Do not hold comparator to direct sunlight or artificial light reflected from white surface when comparing colors. Test results will not be correct.

12 Hold color comparator to good light source and look through eyepiece at a distance of about 10 in.

13 Rotate disc until color on right matches color of sample on left as closely as possible.

14 Record value number in number display window. If color of sample is between colors on disc, the value number must be estimated.

15 Remove sample cells from color comparator and discard water. Rinse cells and place in kit container.

16 Remove prism eyepiece and place in kit container.

17 Remove attaching screws and front cover on comparator body. Remove chlorine color disc and place in kit container.

18 Place front cover on comparator body. Install screws and tighten. Place color comparator in kit container. Fasten latch on kit container.

19 Store kit in metal box mounted on hypochlorination unit skid.

2-16. OPERATION OF DISTRIBUTION POINTS (CONT)

g. Performing pH Tests

1 Locate color comparator kit.

2 Remove two attaching screws and cover.

CAUTION

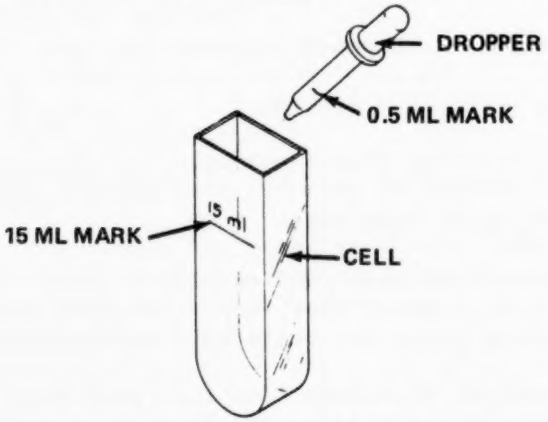
Make sure correct disc is used for pH test. Tag on disc should either read WIDE RANGE INDICATOR-D or pH. If wrong disc is used, test results will be incorrect.

3 Place pH color disc in comparator with numbers on disc facing outward. Place front cover over disc. Ensure that number display window on cover is at top of comparator. Install screws and tighten.

4 Place prism eyepiece over sample cell windows on comparator.

5 Fill sample cell to 15 ml mark with water from manual disbursing station.

6 Insert this cell in right-hand cell space of comparator.



7 Remove dropper from bottle of pH indicator (item 5, appendix D). Fill dropper to 0.5 ml mark and add indicator to second cell.

8 Fill second cell to 15 ml mark with water from manual dispersing station.

9 Insert second cell in left-hand cell space of comparator.

10 Hold comparator to good light source and look through eyepiece at a distance of about 10 in.

2-16. OPERATION OF DISTRIBUTION POINTS (CONT)

11 Rotate disc until color on right matches color of sample on left as closely as possible.

12 Record value number in display window. If color of sample is between colors on disc, the value number must be estimated.

13 Remove sample cells from color comparator and discard water. Rinse cells and place in kit container.

14 Remove prism eyepiece and place in kit container.

15 Remove attaching screws and front cover on comparator body. Remove pH color disc and place in kit container.

16 Place front cover on comparator body. Install screws and tighten. Place color comparator in kit container. Fasten latch on kit container.

17 Store kit in metal box mounted on hypochlorination unit skid.

2-17. OPERATION OF AUXILIARY EQUIPMENT. (At present, no auxiliary equipment has been designated for use with TWDS.)

2-18. PREPARATION FOR MOVEMENT: GENERAL

a. Preparing TWDS for movement requires the following:

(1) Removing water from system

(2) Shutting down and disassembling major components

(3) Repacking major components

b. Remove water at the lead pumping station first, then move down the line to the last boost pumping station. After hoseline water has been removed, empty storage tanks and begin to disassemble major components.

c. To begin emptying hoseline, shut down lead pump (para 2-13). Close butterfly valves on suction and discharge ports of lead pump. Continue to run downline boost pumping stations.

d. If boost pumps are operated in manual or electric manual mode, monitor pressure at suction ports. Allow first boost pump to operate until suction pressure falls to 20 psi. At that time, manually decrease engine speed. When suction pressure reaches 10 psi, shut down the pump (para 2-14). Isolate pump assembly from hoseline by opening butterfly valve on bypass system and closing butterfly valves on suction and discharge hoses. Repeat procedure with each downline pump.

2-18. PREPARATION FOR MOVEMENT: GENERAL (CONT)

e. If boost pumps are operated in electric automatic mode, engine speed will automatically decrease to idle as suction pressure reduces to 10 psi. Shut down first boost pump when it begins to operate at idle speed. Isolate pump assembly from hoseline by opening butterfly valve on bypass system and closing butterfly valves on suction and discharge hoses. Repeat procedure with each downline pump.

f. Once all pumping stations have been shut down and isolated from hoseline, use 125 gpm pump to drain storage tanks. Empty solution from reservoirs on hypochlorination units. Temporarily leave units in operation to flush parts with untreated water. After flushing for 10 minutes, disconnect hypochlorination units and continue to empty storage tanks. Detailed procedures for removing water from storage tanks are provided in paragraph 2-23.

g. Pumping stations can be disassembled when they are shut down. Distribution points can be partially disassembled while storage tanks are being drained, and completely disassembled when tanks are empty. Storage assemblies can be disassembled when tanks are collapsed.

h. Shutdown of the 10-mile hoseline segment includes the following:

(1) Disconnecting and evacuating hoseline lengths

(2) Repacking hoseline lengths

(3) Disassembling suspension devices

(4) Digging up road crossing guards

(5) Disconnecting the pressure-reducing valve assembly

Disconnect, evacuate, and repack the hoseline first. Use the displacement and evacuation kit to remove water and collapse hoseline. The kit requires an air compressor for operation. Use the packing kit to compress hoseline lengths when flaking boxes are repacked.

i. Begin hoseline shutdown at the first 500 ft length and move down the line. Repack hoseline lengths when they are evacuated and collapsed. Crews repacking hoseline segments can follow behind those evacuating and collapsing hoseline. Suspension devices, road crossing guards, and the pressure-reducing valve that were placed along hoseline route are removed when crews reach installation sites.

j. The pumping stations, storage assemblies, and distribution points can be repacked in any sequence. Pack the 10-mile hoseline segment crate, containing kits required to repack the hoseline, last.

2-18. PREPARATION FOR MOVEMENT: GENERAL (CONT)

k. Pack all components for the six pumping stations in one crate, except for trailer-mounted pump assemblies. Collect pumping station components and packing materials at a single site before repacking crate. Otherwise, all packing materials must be shuttled to each installation site for packing.

l. Pack all components for the two storage assemblies, except collapsible storage tanks, together in one crate. Collect all components for both storage assemblies and all packing materials at a single site before repacking crate.

m. Pack all components for two distribution points, except 125 gpm pumps, in one crate. Collect all components for both distribution points at a single site before repacking crate.

n. Pack all components for the 10-mile hoseline segment, except for hoseline and flaking boxes, in one crate. Collect all 10-mile hoseline segment components at a single site before repacking crate.

o. Packing TWDS requires the following general steps:

(1) Remove lids from crates. As required, remove blocking, bracing, anchoring, packing materials, and fiberboard and plywood boxes stored in each crate.

(2) Remove packing material from individual containers.

(3) Return components to original containers.

(4) Pack fiberboard boxes in plywood boxes.

(5) Close covers on fiberboard boxes and nail shut.

(6) Pack plywood boxes in crates.

(7) Install blocking, bracing, and anchoring securing contents within each crate as required.

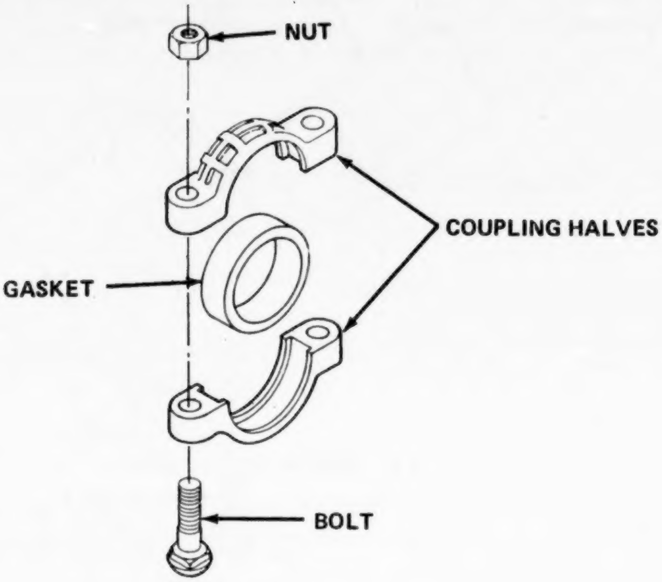
(8) Install plywood sheathing on top of each crate. Nail down.

(9) Roll out polyethylene barrier and position over plywood sheathing on top of each crate.

(10) Install cross-sheathing boards on top of each crate. Nail down.

p. After repacking, TWDS is ready for movement to another location.

2-19. GROOVED PIPE COUPLING REMOVAL



NOTE

This a general procedure for removal of grooved pipe couplings throughout the system. Unless step states otherwise (see NOTE, subpara b below), follow this procedure when removing a grooved pipe coupling connecting two TWDS components.

a. Removal

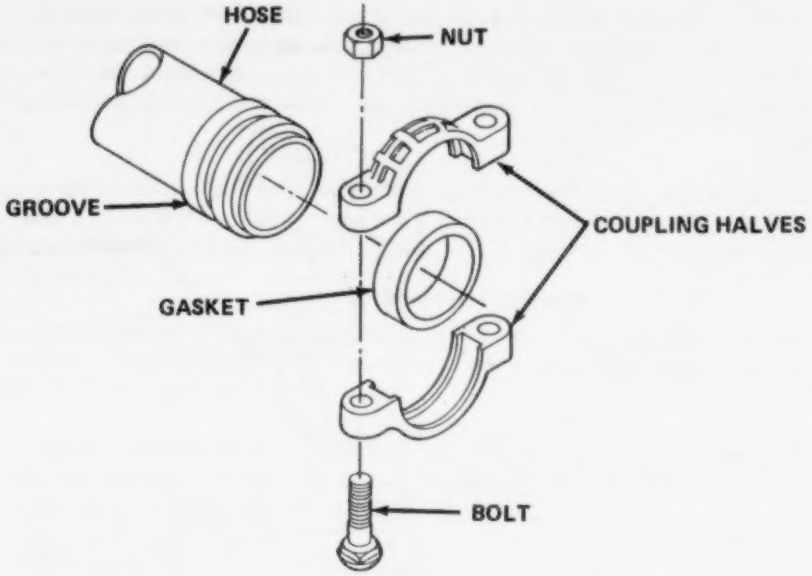
1 Remove two nuts and bolts holding coupling halves together. Remove coupling halves.

2 Slide gasket away from center position between grooved fittings. Separate components and remove gasket.

3 Install gasket in coupling halves. Install two bolts and nuts.

4 Tighten nuts until coupling halves are held firmly together.

2-19. GROOVED PIPE COUPLING REMOVAL (CONT)



NOTE

In some cases, grooved pipe couplings are part of a hose assembly and must be installed over the hose end for packing purposes. When step instructs to do so, follow this procedure when installing a grooved pipe coupling over the end of a hose.

b. Installation

1 Remove two nuts and bolts holding coupling halves together. Remove coupling halves.

2 Slide gasket away from center position between grooved fittings. Separate components.

3 Position gasket over end of hose, being sure that it does not overhang end of hose. No portion of gasket should overhang groove on hose.

4 Place coupling halves over gasket. Make sure keys on coupling halves are in groove on end of hose.

5 Install two bolts and two nuts. Tighten nuts until coupling halves are held firmly together.

2-20. MOVEMENT OF LEAD PUMPING STATION

a. Disassembly Requirements. Disassembly of the lead pumping station requires the tools and personnel listed below. Pack the components listed below in the PUMPING STATIONS and 10-MILE SEGMENT crates.

Tools	Used To
1-1/4 in. socket wrench and handle	Remove 6 in. grooved pipe couplings
Pipe wrench	Remove components with threads

Personnel

Two required for disassembly of lead pumping station

Components

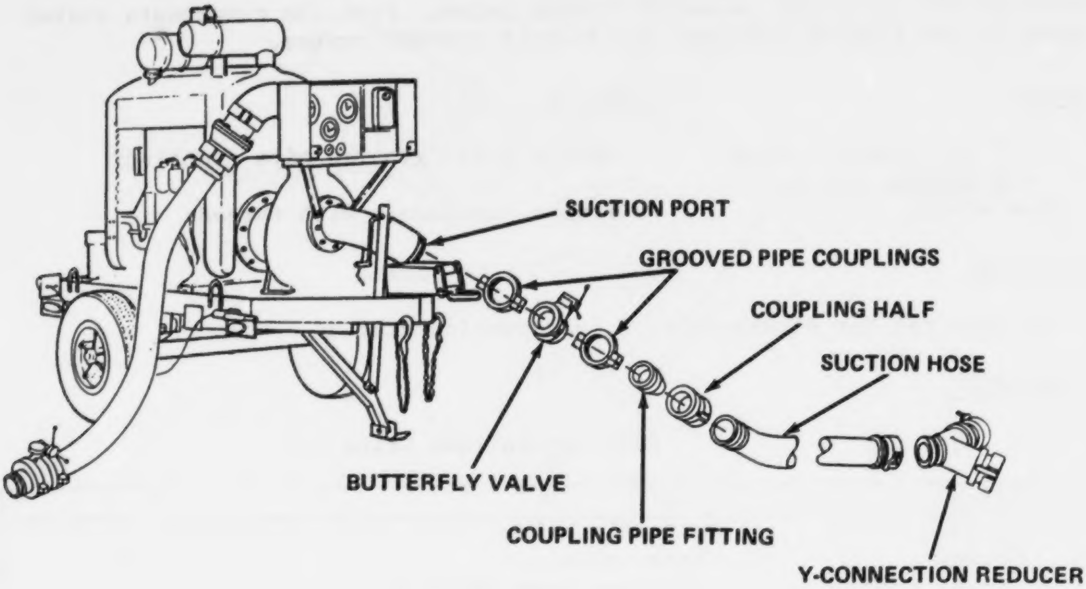
PUMPING STATIONS Crate

Qty	Size	Item
2	6 in.	Butterfly valve
1	6 in.	Check valve
1	6 in. x 20 ft	Discharge hose assembly
4	6 in.	Grooved pipe coupling
1	6 in.	Pressure relief valve and nipple

10-MILE SEGMENT Crate

Qty	Size	Item
1	6 in.	Coupling half, quick-disconnect, female
1	6 in.	Coupling pipe fitting
12	6 in. x 10 ft	Suction hose assembly
1	6 in. x 4 in. x 4 in.	Y-connection reducer

2-20. MOVEMENT OF LEAD PUMPING STATION (CONT)


SUCTION PORT
GROOVED PIPE COUPLINGS
COUPLING HALF
SUCTION HOSE
BUTTERFLY VALVE
COUPLING PIPE FITTING
Y-CONNECTION REDUCER

b. Disassembly

NOTE

Set aside all removed components for repacking.

1 Push cam arms on Y-connection reducer forward to open. Remove Y-connection reducer from water source.

2 Push cam arms on suction hose forward to open. Remove Y-connection reducer from suction hose.

3 Push cam arms on coupling half forward to open. Remove suction hose from coupling half.

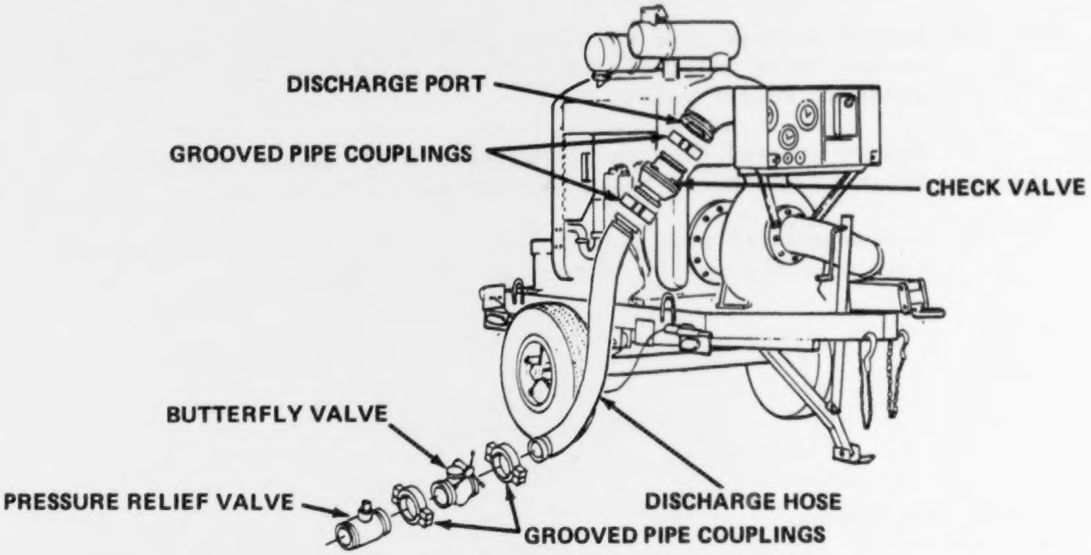
4 Disconnect additional suction hose lengths as required.

5 Remove grooved pipe coupling (para 2-19) connecting coupling pipe fitting to butterfly valve. Remove coupling pipe fitting with attached coupling half.

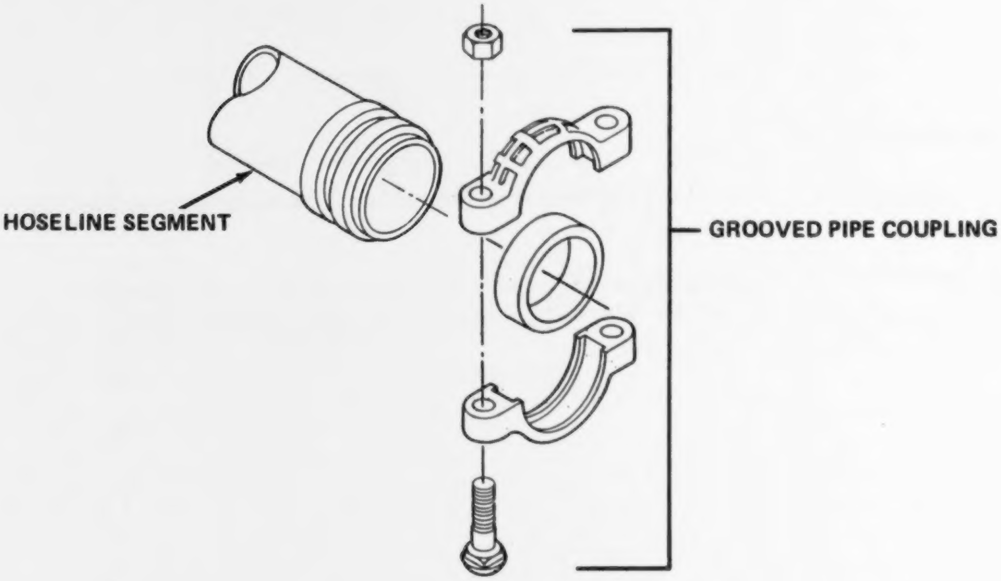
6 Remove coupling half from coupling pipe fitting.

7 Remove grooved pipe coupling (para 2-19) connecting butterfly valve to suction port on pump. Remove butterfly valve.

2-20. MOVEMENT OF LEAD PUMPING STATION (CONT)


DISCHARGE PORT
GROOVED PIPE COUPLINGS
CHECK VALVE
BUTTERFLY VALVE
PRESSURE RELIEF VALVE
DISCHARGE HOSE
GROOVED PIPE COUPLINGS

8 Remove grooved pipe coupling (para 2-19) connecting pressure relief valve to downline hoseline. Remove hoseline segment.


HOSELINE SEGMENT
GROOVED PIPE COUPLING

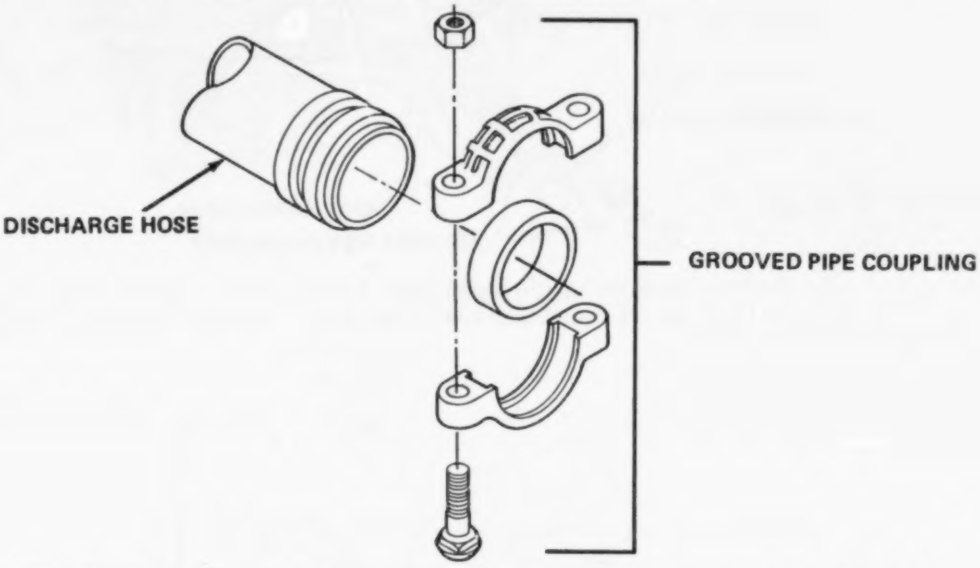
9 Install grooved pipe coupling (para 2-19) on end of hosline segment.

2-20. **MOVEMENT OF LEAD PUMPING STATION** (CONT)

10 Remove grooved pipe coupling (para 2-19) connecting pressure relief valve to butterfly valve on discharge hose. Remove pressure relief valve.

11 Remove grooved pipe coupling (para 2-19) connecting butterfly valve to discharge hose. Remove butterfly valve.

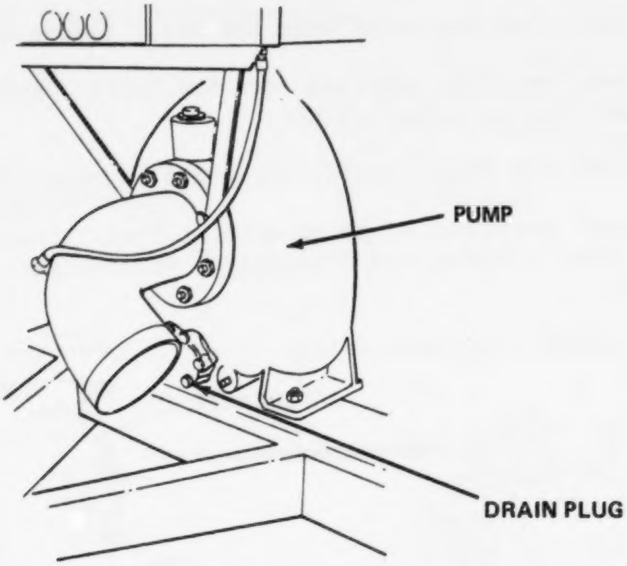
12 Remove grooved pipe coupling (para 2-19) connecting discharge hose to check valve. Remove discharge hose.



13 Install grooved pipe coupling (para 2-19) on end of discharge hose.

14 Remove grooved pipe coupling (para 2-19) connecting check valve to discharge port on pump. Remove check valve.

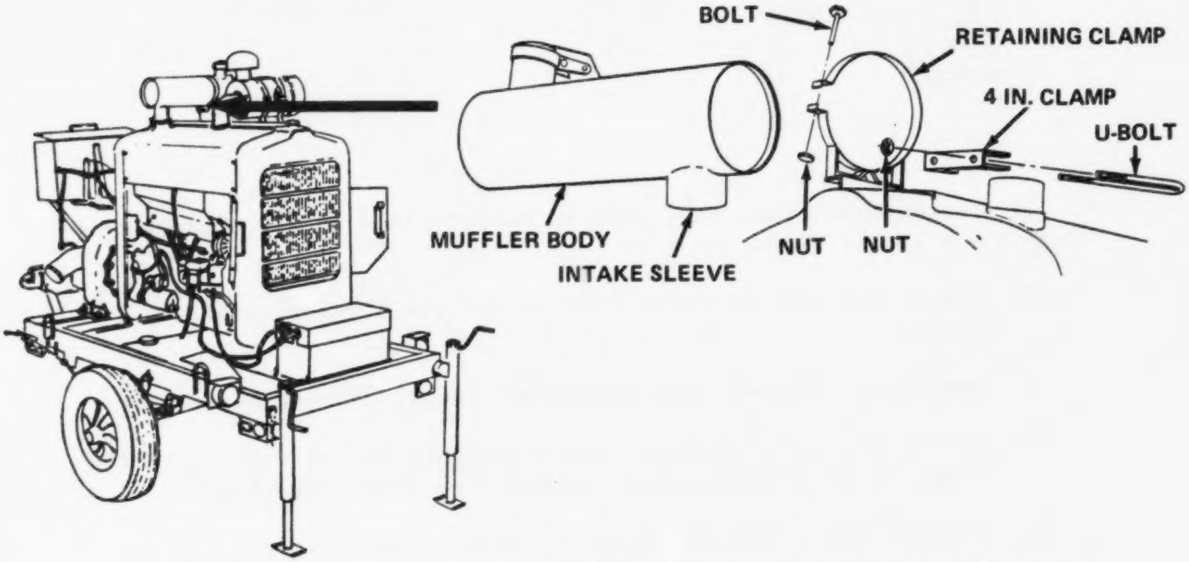
2-20. MOVEMENT OF LEAD PUMPING STATION (CONT)


PUMP
DRAIN PLUG

c. Packing Trailer-Mounted Pump Assembly: Unit 609

1 Open pump drain plug. Drain pump and flush with clean water. Reinstall drain plug.

2 Install plastic caps on pump suction and discharge ports.


BOLT
RETAINING CLAMP
4 IN. CLAMP
U-BOLT
MUFFLER BODY
INTAKE SLEEVE
NUT
NUT

3 Remove two nuts, 4 in. clamp, and U-bolt from muffler intake sleeve.

2-20. MOVEMENT OF LEAD PUMPING STATION (CONT)

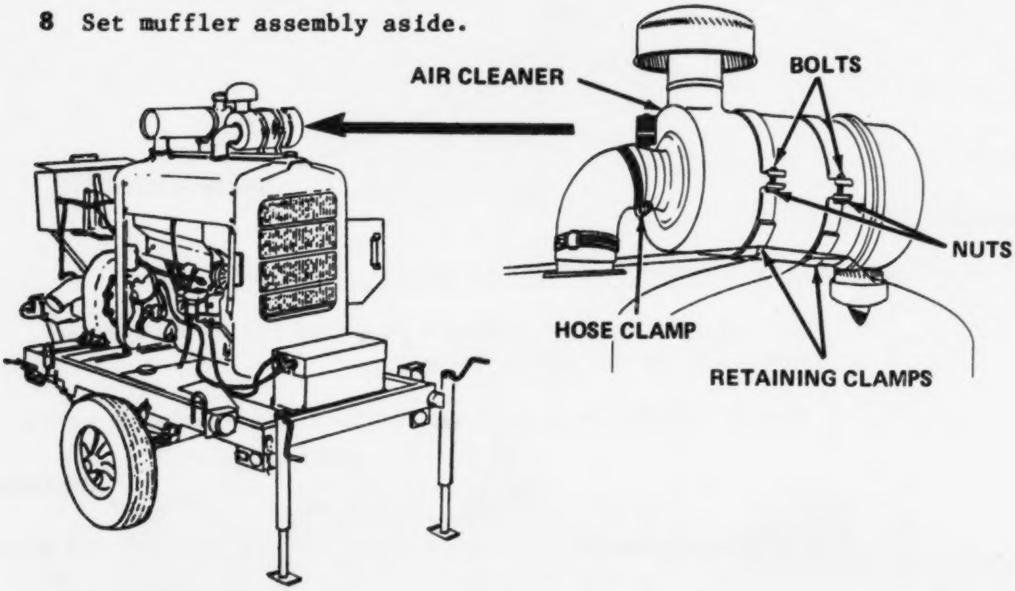
4 Remove retaining clamp bolt and nut. Remove muffler body.

5 Remove two clamp mounting nuts and bolts. Remove retaining clamp from mounting bracket.

6 Install two mounting nuts and bolts on retaining clamp.

7 Install retaining clamp on muffler body. Install clamp bolt and nut. Tighten nut until clamp is firmly secured to muffler body.

8 Set muffler assembly aside.



9 Loosen hose clamp that secures rubber elbow on air cleaner to air intake pipe.

10 Remove nut and bolt from each of two air cleaner retaining clamps.

11 Remove air cleaner from retaining clamps. Remove hose clamp.

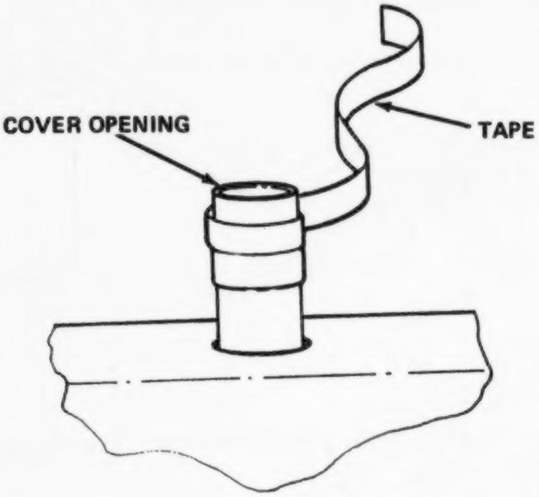
12 Remove two nuts, washers, and bolts that secure each retaining clamp to mounting bracket. Remove two retaining clamps.

13 Install hose clamp on rubber elbow and tighten.

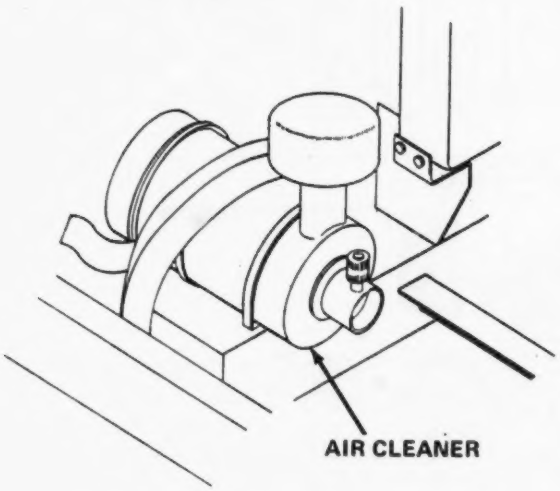
14 Install two retaining clamps on air cleaner body. Install nut and bolt on each clamp. Tighten nuts until each clamp is firmly secured to air cleaner body.

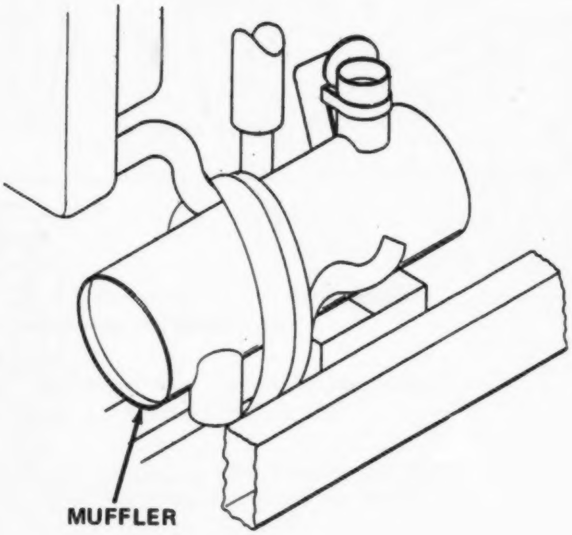
2-20. MOVEMENT OF LEAD PUMPING STATION (CONT)

15 Set air cleaner assembly aside.


COVER OPENING
TAPE

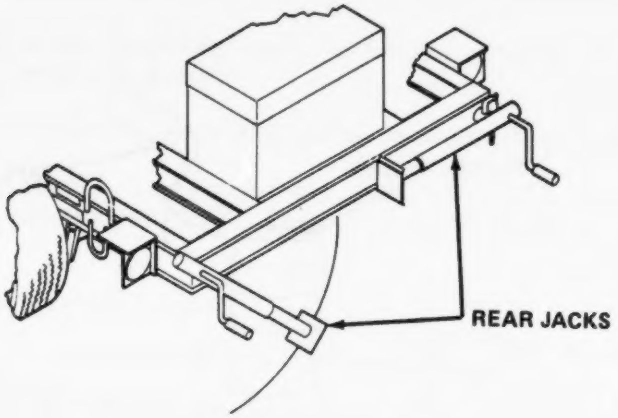
16 Cover air intake and exhaust pipe. Seal with tape (item 13, appendix D).


AIR CLEANER



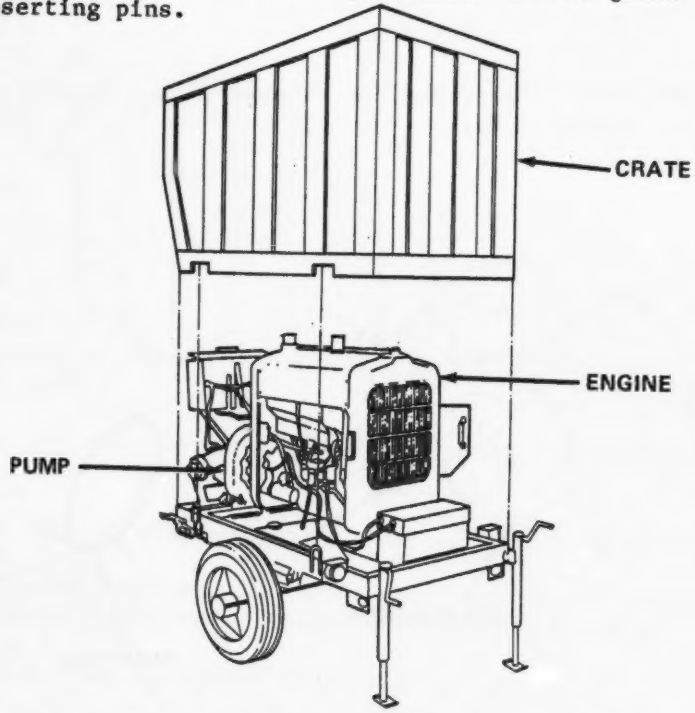
17 Tape air cleaner and exhaust muffler to pump unit. Make sure their positions will not prevent installation of crate.

2-20. MOVEMENT OF LEAD PUMPING STATION (CONT)



18 Retract rear jacks. Remove pins from inner and outer sleeves on jacks.

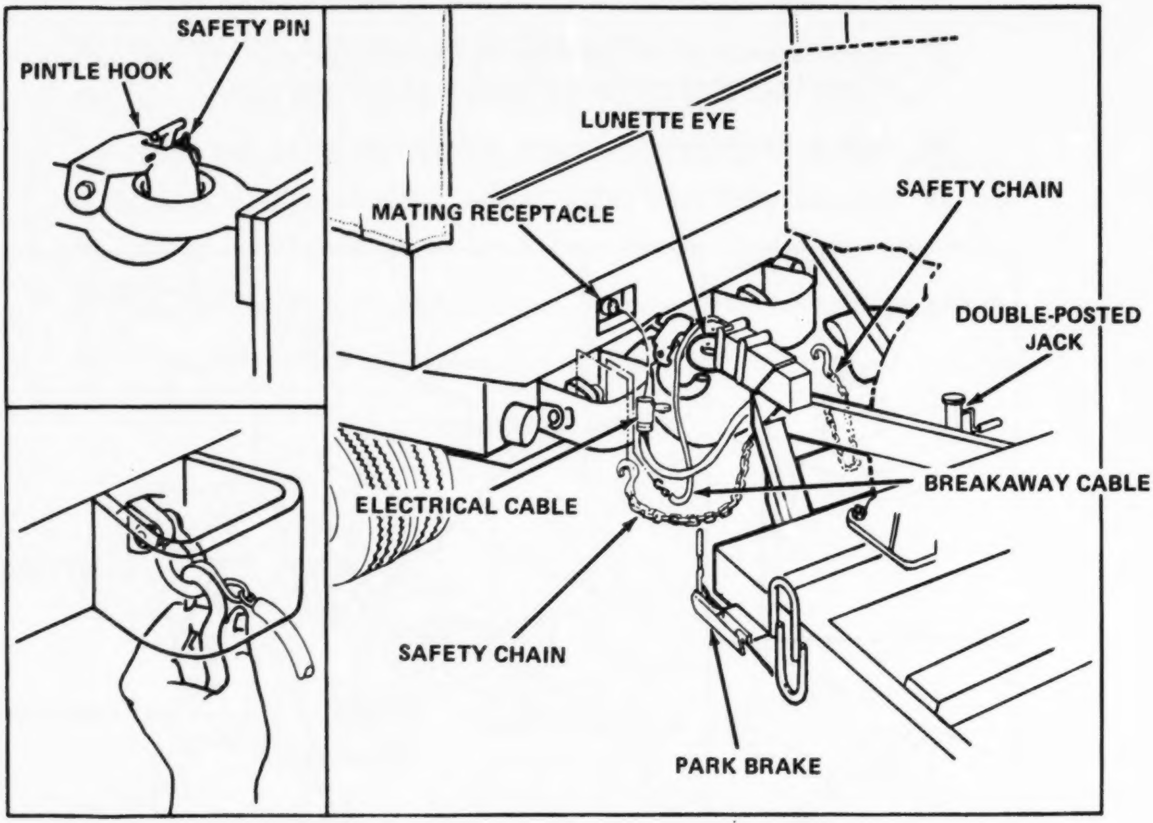
19 Swing jacks into horizontal position. Secure jacks by reinserting pins.



20 Locate crate marked PUMPING ASSEMBLY, 600 GPM. Lower crate onto engine and pump.

2-20. **MOVEMENT OF LEAD PUMPING STATION** (CONT)

21 Secure crate to pump using four pieces of 3/4-inch steel banding (item 2, appendix D). Route two bands over sides and two bands over ends of crate. Tighten and secure bands.


SAFETY PIN
PINTLE HOOK
LUNETTE EYE
MATING RECEPTACLE
SAFETY CHAIN
DOUBLE-POSTED JACK
BREAKAWAY CABLE
ELECTRICAL CABLE
SAFETY CHAIN
PARK BRAKE

NOTE

Perform steps 22 thru 29 if pump unit is equipped with double-posted jack on trailer tongue.

22 Position tow vehicle so that lunette eye on trailer chassis can be lowered onto pintle hook on towing vehicle.

23 Retract double-posted jack until lunette eye rests in pintle hook. Make sure eye is securely in jaws of pintle hook.

24 Insert safety pin in jaws of pintle hook.

2-20. MOVEMENT OF LEAD PUMPING STATION (CONT)

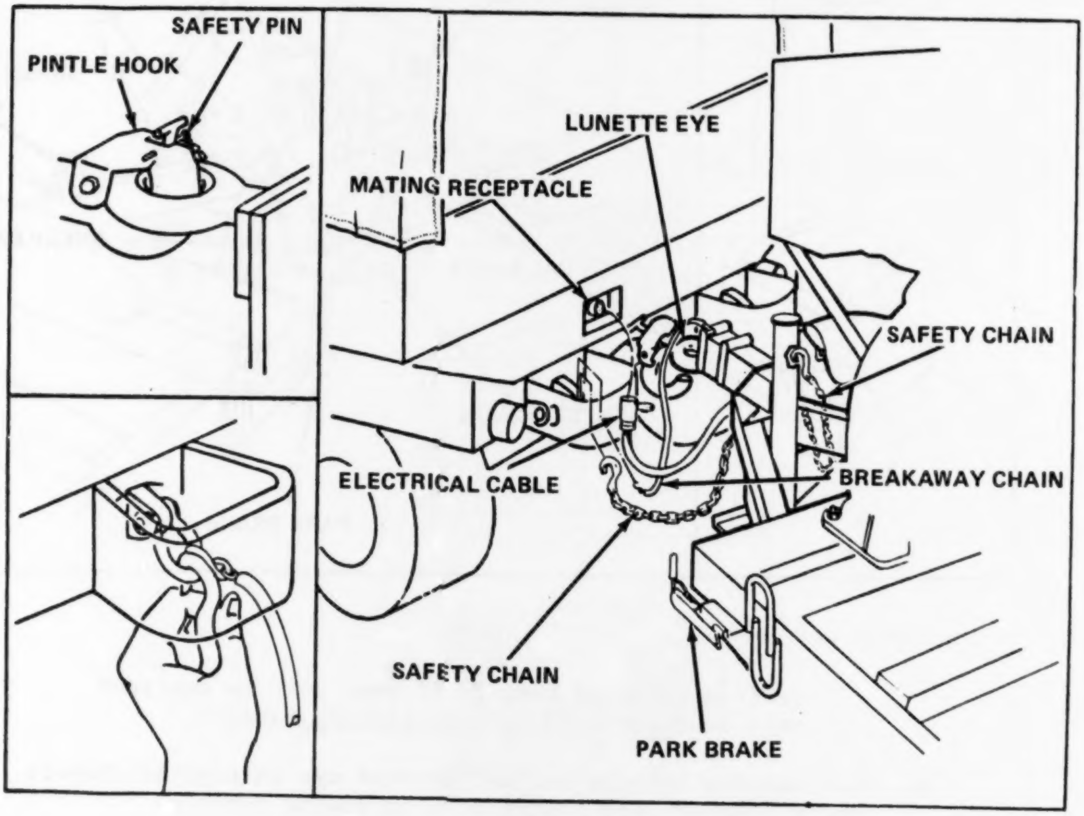
25 Remove pin from inner and outer sleeves on double-posted jack. Swing jack into horizontal position. Secure jack by reinserting pin.

26 Join electrical cable to mating receptacle tow vehicle.

27 Check operation of running and brake lights. If not working properly, notify organizational maintenance.

28 Attach breakaway cable and safety chains to tow vehicle.

29 Release both park brake levers. Remove chocks from wheels.


SAFETY PIN
PINTLE HOOK
LUNETTE EYE
MATING RECEPTACLE
SAFETY CHAIN
ELECTRICAL CABLE
BREAKAWAY CHAIN
SAFETY CHAIN
PARK BRAKE

NOTE

Perform steps 30 thru 37 if pump unit is equipped with front tripod.

30 Position tow vehicle so that lunette eye on trailer chassis can be lowered onto pintle hook on towing vehicle.

2-20. **MOVEMENT OF LEAD PUMPING STATION** (CONT)

31 Retract front tripod until lunette eye rests in pintle hook. Make sure eye is securely in jaws of pintle hook.

32 Insert safety pin in jaws of pintle hook.

33 Retract front tripod to maximum limit.

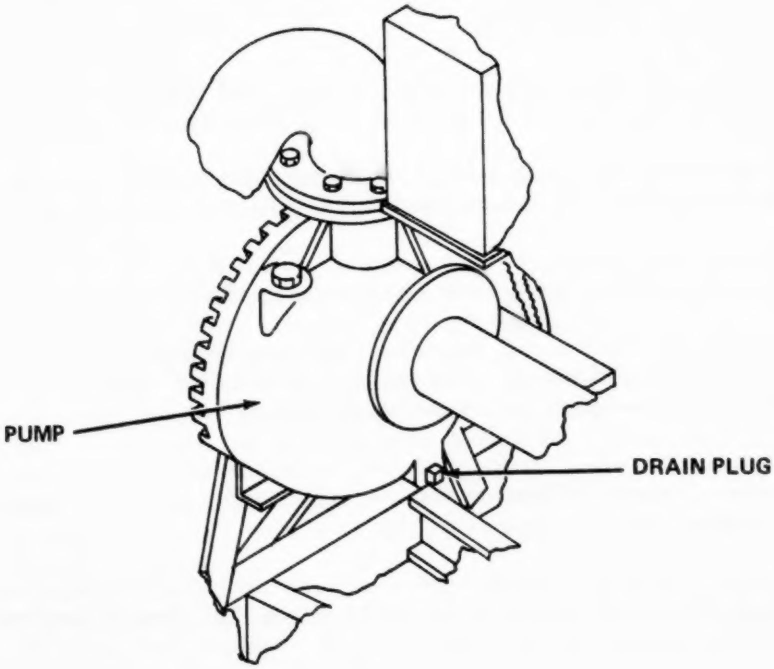
34 Join electrical cable to mating receptacle tow vehicle.

35 Check operation of running and brake lights. If not working properly, notify organizational maintenance.

36 Attach breakaway cable and safety chains to tow vehicle.

37 Release both park brake levers. Remove chocks from wheels.

38 Trailer-mounted pump assembly is now ready for movement to new worksite.

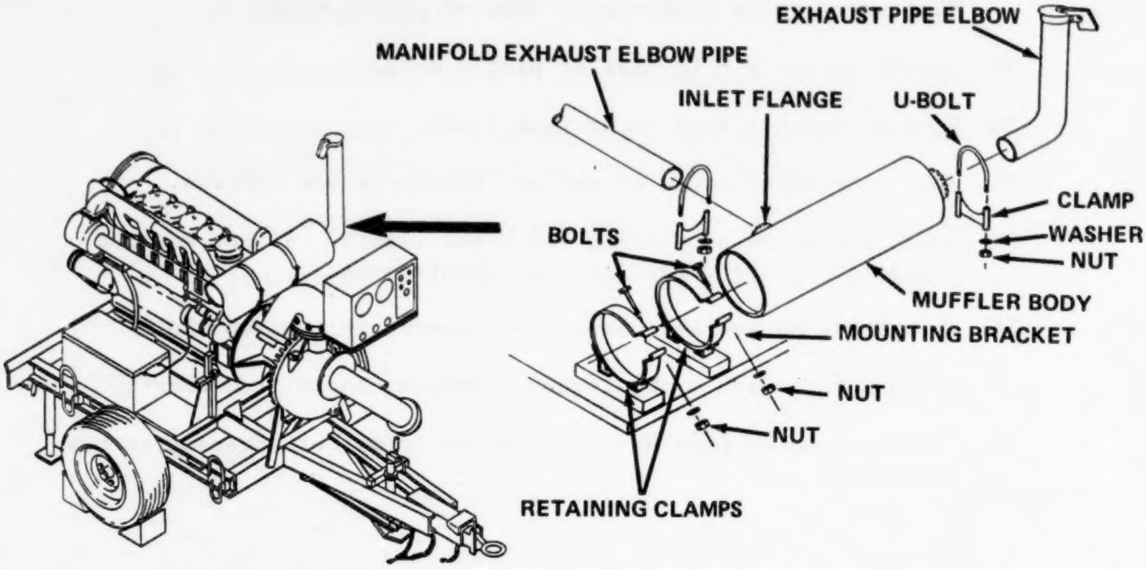


d. Packing Trailer-Mounted Pump Assembly: US636HCCD-1

1 Open pump drain plug. Drain pump and flush with clean water. Reinstall drain plug.

2-20. MOVEMENT OF LEAD PUMPING STATION (CONT)

2 Install plastic caps on pump suction and discharge ports.


EXHAUST PIPE ELBOW
MANIFOLD EXHAUST ELBOW PIPE
INLET FLANGE
U-BOLT
CLAMP
WASHER
NUT
BOLTS
MUFFLER BODY
MOUNTING BRACKET
NUT
NUT
RETAINING CLAMPS

3 Remove two nuts and washers, clamp, and U-bolt that secure exhaust pipe elbow to muffler. Remove exhaust pipe elbow.

4 Remove two nuts and washers, clamp, and U-bolt that secure muffler inlet flange to manifold exhaust elbow pipe.

5 Remove nut and bolt from each of two muffler retaining clamps. Remove muffler body from retaining clamps.

6 Remove two bolts and washers that secure each retaining clamp to mounting bracket. Remove two retaining clamps. Reinstall bolts and washers on mounting bracket.

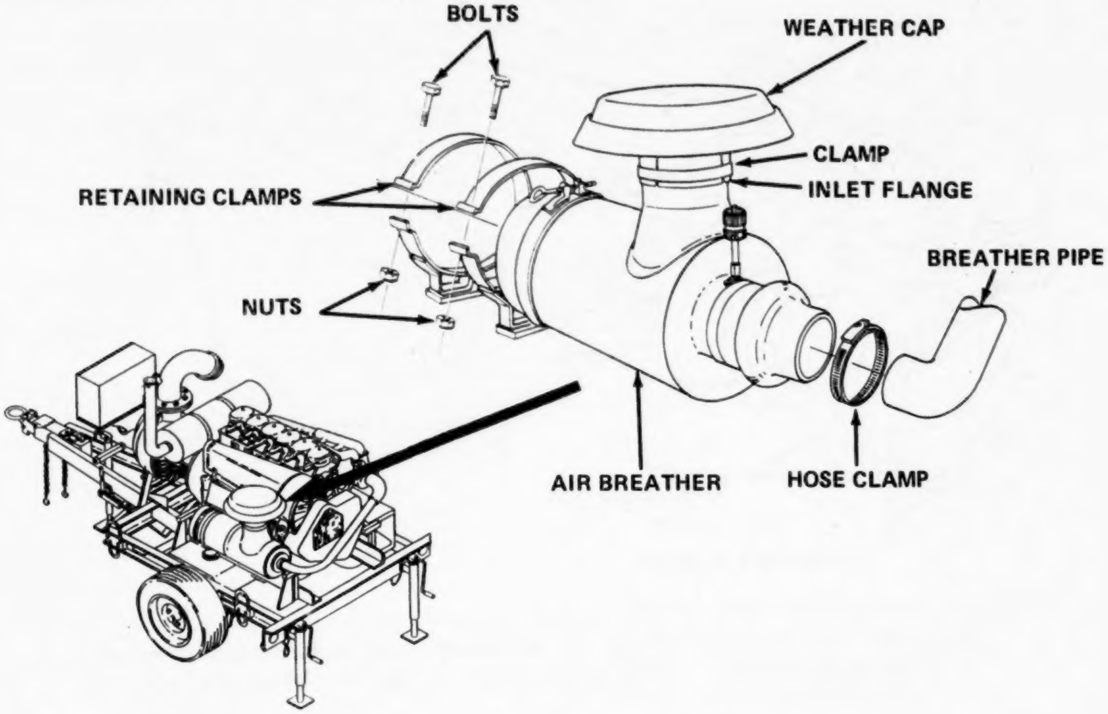
7 Install U-bolt, clamp, and two nuts and washers on muffler inlet flange. Tighten nuts until clamp is firmly secured to flange.

8 Install U-bolt, clamp, and two nuts and washers on exhaust pipe elbow. Tighten nuts until clamp is firmly secured to elbow.

9 Install two retaining clamps on muffler body. Install nut and bolt on each clamp. Tighten nuts until clamps are firmly secured to muffler body.

10 Set exhaust pipe elbow and muffler assembly aside.

2-20. **MOVEMENT OF LEAD PUMPING STATION** (CONT)


BOLTS
WEATHER CAP
CLAMP
INLET FLANGE
RETAINING CLAMPS
BREATHER PIPE
NUTS
AIR BREATHER
HOSE CLAMP

11 Loosen two hose clamps that secure breather pipe to air breather and turbocharger. Remove breather pipe assembly and two clamps.

12 Remove nut and bolt from each of two retaining clamps. Remove air cleaner body from retaining clamps.

13 Remove two bolts and washers that secure each retaining clamp to mounting bracket. Remove two retaining clamps. Reinstall bolts and washers in mounting bracket.

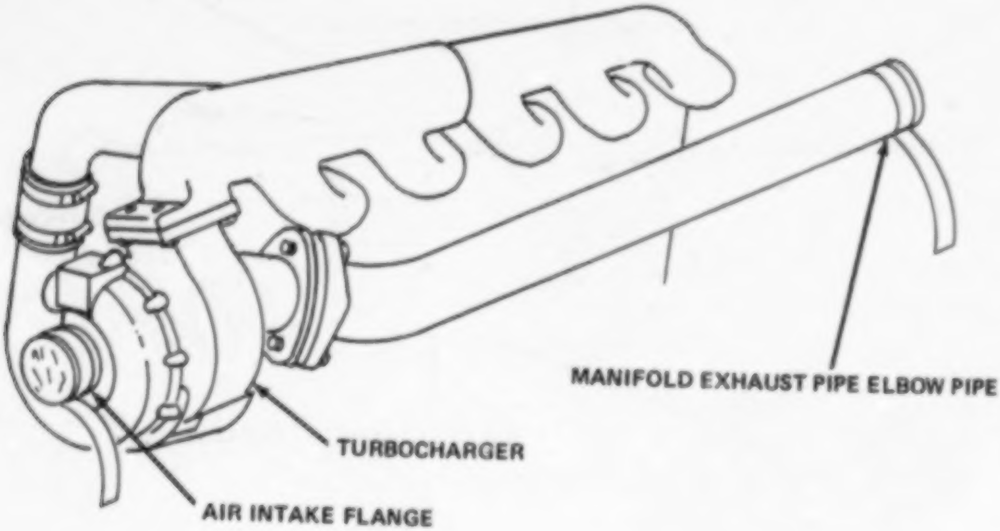
14 Loosen clamp that secures weather cap to air cleaner inlet flange. Remove weather cap. Reinstall clamp on air cleaner inlet flange.

15 Install retaining clamps on air cleaner body. Install nut and bolt on each clamp. Tighten nuts until clamps are firmly secured to air cleaner body.

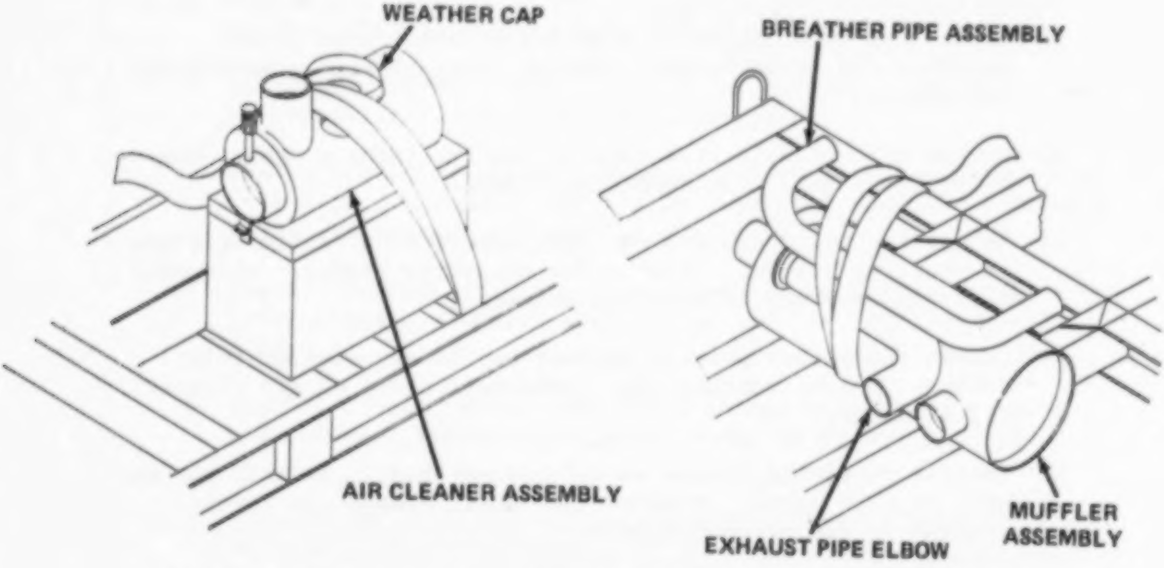
16 Install two hose clamps on breather pipe assembly.

17 Set weather cap, breather pipe assembly, and air breather assembly aside.

2-20. MOVEMENT OF LEAD PUMPING STATION (CONT)

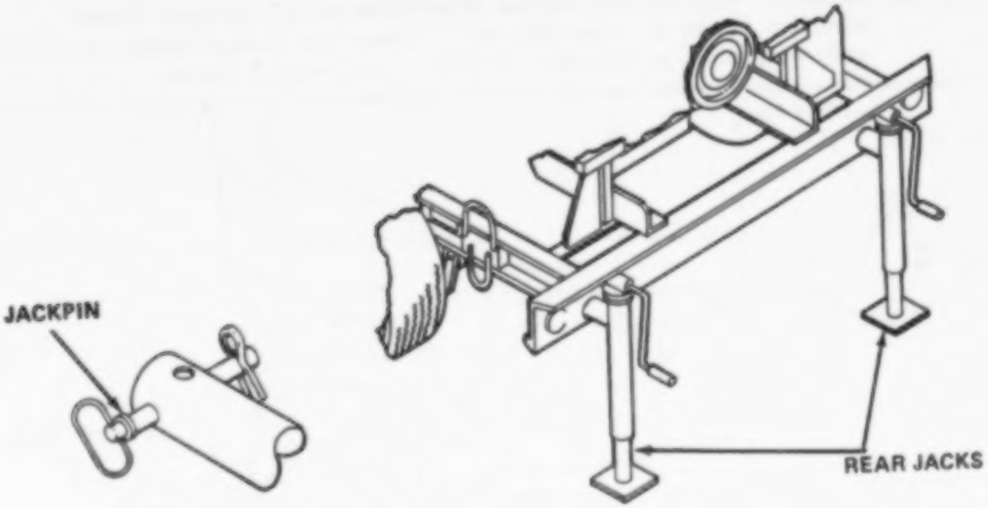

MANIFOLD EXHAUST PIPE ELBOW PIPE
TURBOCHARGER
AIR INTAKE FLANGE

18 Cover air intake flange on turbocharger and manifold exhaust pipe elbow pipe. Seal with tape (item 13, appendix D).

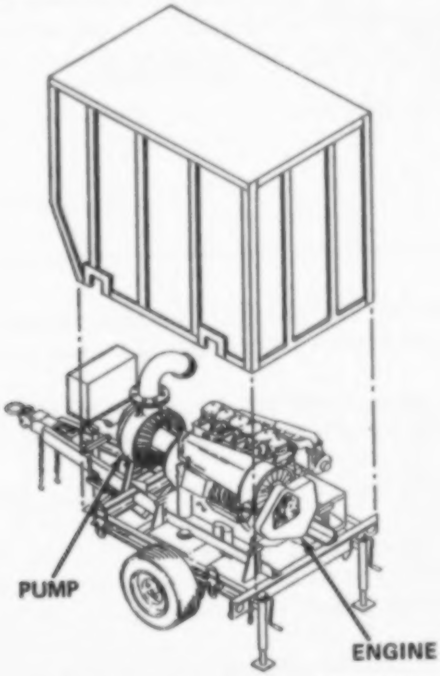

WEATHER CAP
BREATHER PIPE ASSEMBLY
AIR CLEANER ASSEMBLY
MUFFLER ASSEMBLY
EXHAUST PIPE ELBOW

19 Tape air cleaner assembly, breather pipe assembly, weather cap, muffler assembly, and exhaust pipe elbow to pump unit. Make sure their positions will not prevent installation of crate.

2-20. MOVEMENT OF LEAD PUMPING STATION (CONT)


JACKPIN
REAR JACKS

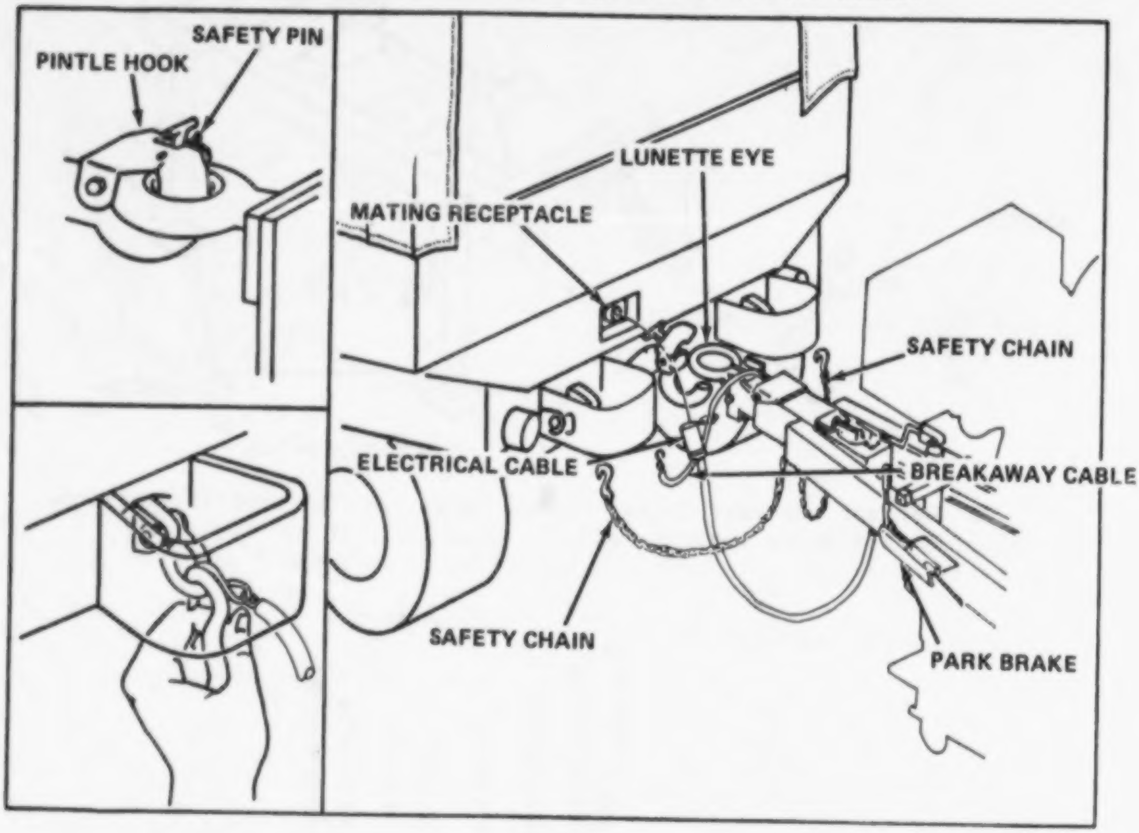
20 Retract two rear jacks. Swing jacks into horizontal position. Secure jacks with jackpins.


PUMP
ENGINE

21 Locate crate marked PUMPING ASSEMBLY, 600 GPM. Lower crate onto engine and pump.

2-20. MOVEMENT OF LEAD PUMPING STATION (CONT)

22 Secure crate to pump using four pieces of 3/4 in. steel banding (item 2, appendix D). Route two bands each over sides and over ends of crate. Tighten and secure bands.


SAFETY PIN
PINTLE HOOK
LUNETTE EYE
MATING RECEPTACLE
SAFETY CHAIN
ELECTRICAL CABLE
BREAKAWAY CABLE
SAFETY CHAIN
PARK BRAKE

23 Position tow vehicle so that lunette eye on trailer chassis can be lowered onto pintle hook on towing vehicle.

24 Make sure lunette eye is securely in jaws of pintle hook on towing vehicle. Insert safety pin in pintle hook.

25 Retract front tripod to maximum limit.

26 Join electrical connection to tow vehicle. Check operation of running and brake lights. If not working properly, notify organizational maintenance.

27 Attach safety chains to tow vehicle. Attach breakaway cable to tow vehicle for emergency actuation of brake system.

2-20. MOVEMENT OF LEAD PUMPING STATION (CONT)

28 Check that all components and accessories of pump assembly are secure.

29 Release parking brake lever. Remove chocks from wheels.

WARNING

- For proper towing, hitch weight must be no less than 15 percent or no more than 25 percent of gross vehicle weight rating (found on trailer identification tag at trailer A-frame). Failure. to comply with these limits can result in improper towing, swaying, or trailer hitch damage. In extreme cases, an accident may result.
- Gross axle weight rating and maximum allowable speed recommendations (both found on identification tag at trailer A-frame) must not be exceeded.
- Avoid making turns at high speed when towing trailer-mounted pump. Maximum allowable trailer-mounted pump towing speed is 50 mph.

30 Trailer-mounted pump assembly is now ready for movement to new worksite.

d. Return to Service. See paragraph 2-7.

2-21. MOVEMENT OF BOOST PUMPING STATIONS

a. Disassembly Requirements. Disassembly of a boost pumping station requires the tools and personnel listed below. Pack the components listed below in the PUMPING STATIONS crate.

Tools	Used To
1-1/4 in. socket wrench and handle	Remove 6 in. grooved pipe couplings

Personnel

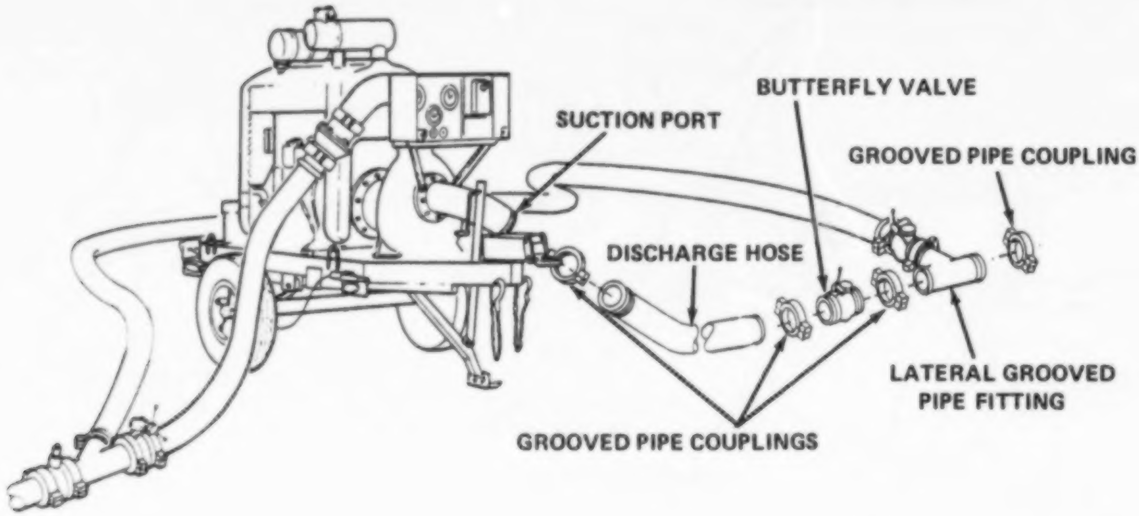
Two required for disassembly of boost pumping station

Components

PUMPING STATIONS Crate

Qty	Size	Item
3	6 in.	Butterfly valve
1	6 in.	Check valve
1	6 in. x 10 ft	Discharge hose assembly
1	6 in. x 20 ft	Discharge hose assembly
1	6 in. x 75 ft	Discharge hose assembly
12	6 in.	Grooved pipe coupling
2	6 in.	Lateral grooved pipe fitting
1	6 in.	Pressure relief valve and nipple

2-21. MOVEMENT OF BOOST PUMPING STATIONS (CONT)


BUTTERFLY VALVE
SUCTION PORT
GROOVED PIPE COUPLING
DISCHARGE HOSE
LATERAL GROOVED PIPE FITTING
GROOVED PIPE COUPLINGS

b. Disassembly

NOTE

Set aside all removed components for repacking.

1 Remove grooved pipe coupling (para 2-19) connecting lateral grooved pipe fitting to upline hoseline. Remove hoseline segment.

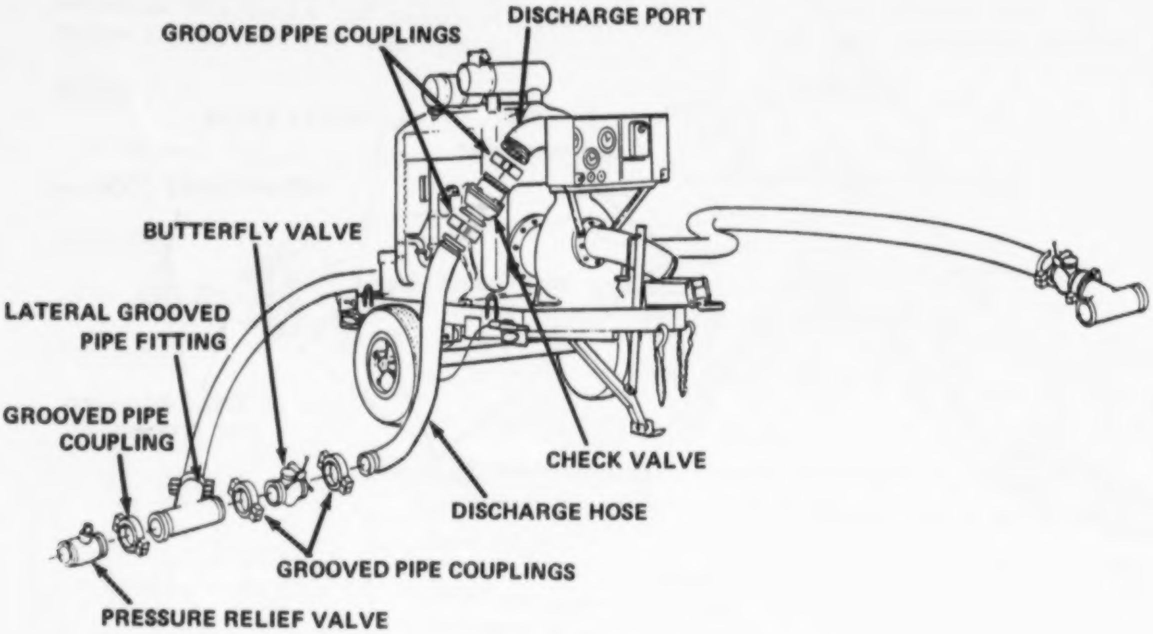
2 Remove grooved pipe coupling (para 2-19) connecting lateral grooved pipe fitting to butterfly valve.

3 Remove grooved pipe coupling (para 2-19) connecting butterfly valve to discharge hose. Remove butterfly valve.

4 Remove grooved pipe coupling (para 2-19) connecting discharge hose to suction port on pump. Remove discharge hose.

5 Install grooved pipe coupling (para 2-19) on end of discharge hose.

2-21. MOVEMENT OF BOOST PUMPING STATIONS (CONT)


DISCHARGE PORT
GROOVED PIPE COUPLINGS
BUTTERFLY VALVE
LATERAL GROOVED PIPE FITTING
GROOVED PIPE COUPLING
CHECK VALVE
DISCHARGE HOSE
GROOVED PIPE COUPLINGS
PRESSURE RELIEF VALVE

6 Remove grooved pipe coupling (para 2-19) connecting pressure relief valve to downline hoseline. Remove hoseline segment.

7 Install grooved pipe coupling (para 2-19) on end of hoseline segment.

8 Remove grooved pipe coupling (para 2-19) connecting pressure relief valve to lateral grooved pipe fitting. Remove pressure relief valve.

9 Remove grooved pipe coupling (para 2-19) connecting lateral grooved pipe fitting to butterfly valve.

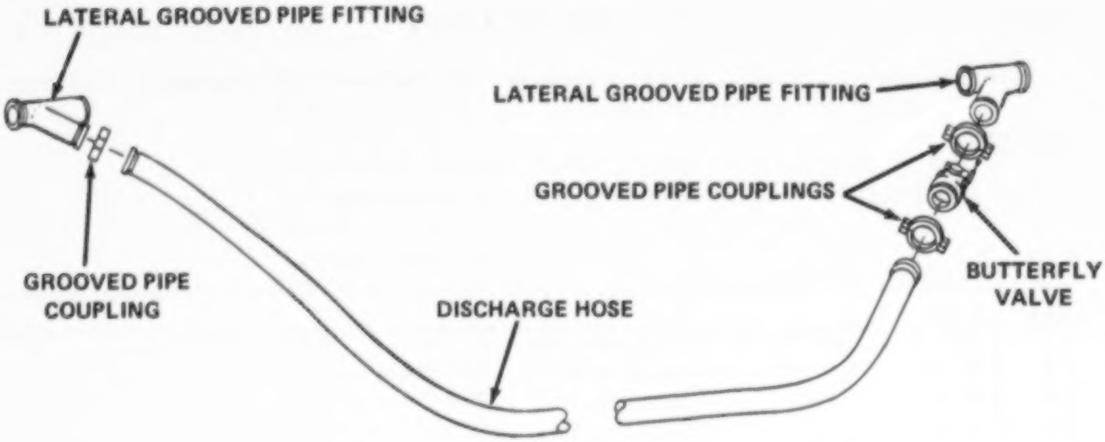
10 Remove grooved pipe coupling (para 2-19) connecting butterfly valve to discharge hose. Remove butterfly valve.

11 Remove grooved pipe coupling (para 2-19) connecting discharge hose to check valve. Remove discharge hose.

12 Install grooved pipe coupling (para 2-19) on end of discharge hose.

2-21. MOVEMENT OF BOOST PUMPING STATIONS (CONT)

13 Remove grooved pipe coupling (para 2-19) connecting check valve to discharge port on pump. Remove check valve.


LATERAL GROOVED PIPE FITTING
LATERAL GROOVED PIPE FITTING
GROOVED PIPE COUPLINGS
BUTTERFLY VALVE
GROOVED PIPE COUPLING
DISCHARGE HOSE

14 Remove grooved pipe coupling (para 2-19) connecting lateral grooved pipe fitting to butterfly valve. Remove lateral grooved pipe fitting.

15 Remove grooved pipe coupling (para 2-19) connecting butterfly valve to discharge hose. Remove butterfly valve.

16 Install grooved pipe coupling (para 2-19) on end of discharge hose.

17 Remove grooved pipe coupling (para 2-19) connecting discharge hose to lateral grooved pipe fitting. Remove discharge hose and lateral grooved pipe fitting.

c. Packing Trailer-Mounted Pump Assembly: Unit 609. See paragraph 2-20b.

d. Packing Trailer-Mounted Pump Assembly: US636HCCD-1. See paragraph 2-20c.

e. Return to Service. See paragraph 2-8.

2-22. MOVEMENT OF DISTRIBUTION POINTS

a. Packing Requirements. Disassembly of distribution points requires the tools, personnel, and components listed below. Replace the required components taken from the PUMP, CENTRIFUGAL, 125 GPM and DISTRIBUTION POINT crates.

Tools	Used To
Pipe wrench	Remove components with threaded fittings.

Personnel

Two required for disassembly of distribution point

DISTRIBUTION POINT Crate

Qty	Size	Item
1		Color comparator kit
4	2 in.	Coupling half, 200-B
4	2 in.	Coupling half, 200-DP
4	2 in.	Coupling half, 200-F
1	2 in. x 10 ft	Discharge hose assembly
7	2 in. x 20 ft	Discharge hose assembly
2	36 gal	Drinking water storage bag
2	2 in. x 2 in.	Elbow valve
2	2 in.	Gate valve
1	100 gpm	Hypochlorination unit
1	2 in. x 20 ft	Suction hose assembly
2		Nozzle
2		Nozzle stand assembly
2	2 in. x 1.5 in.	Reducer, quick-disconnect, threaded, 2015-B
2	2 in. x 1.5 in.	Reducer, quick-disconnect, 2015-DA
1	2 in. x 3 in.	Reducer, quick-disconnect, 2030-DA-AL
1	2 in. x 4 in.	Reducer, quick-disconnect, 2040-DA-AL
1	4 in. x 2 in.	Reducer, quick-disconnect, 4020-DA
3	2 in. x 2 in. x 2 in.	Y-connection, quick-disconnect

PUMP, CENTRIFUGAL, 125 GPM Crate

Qty	Size	Item
1		Pump, centrifugal, 125 gpm

2-22. MOVEMENT OF DISTRIBUTION POINTS (CONT)

b. Disassembly

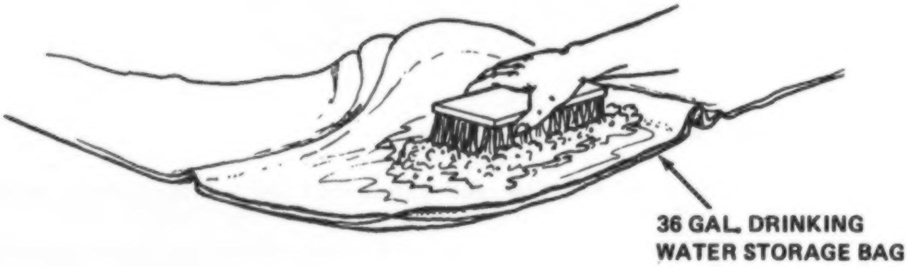
WARNING

DANGEROUS CHEMICALS

- Calcium hypochlorite can cause injury if not handled properly. Heed safety measures below.
- If calcium hypochlorite comes into contact with skin or eyes, flush right away with water. Seek medical help.
- Mix only in accordance with directions for use.
- DO NOT allow calcium hypochlorite to mix with any other materials. This may cause fire or hazardous gases.

1 Locate packing crate marked DISTRIBUTION POINT. Remove tubes of calcium hypochlorite (item 4, appendix D).

2 Dissolve one tube in each gallon of potable water used to make a cleaning solution.



3 Scrub inside of each 36 gal. drinking water storage bag with solution.

4 Rinse each water bag several times with potable water to get rid of all traces of cleaning solution. Do not use cleaning solution to rinse bags.

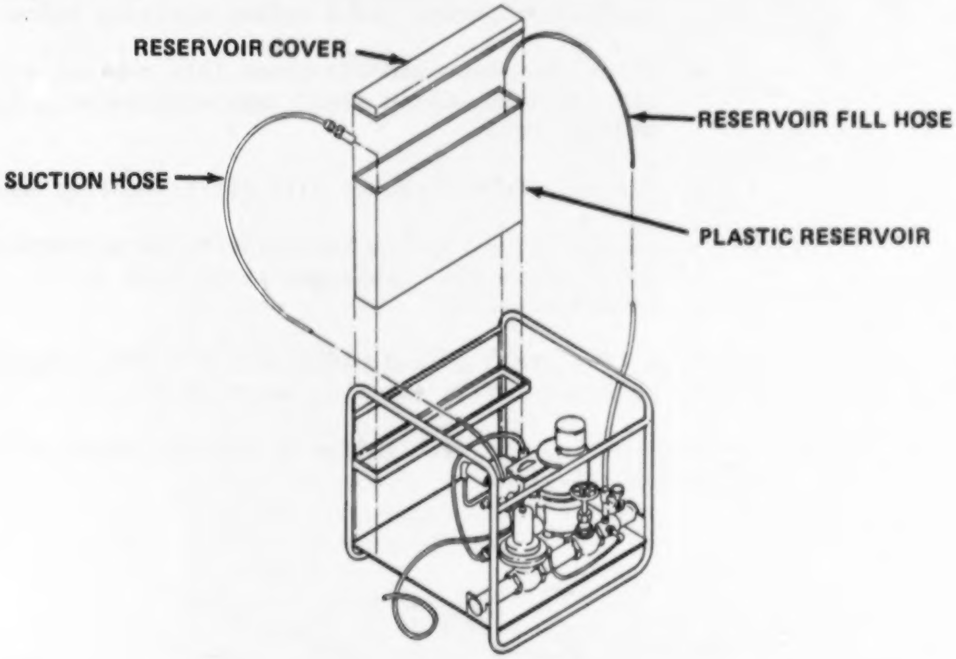
5 Dry bags completely and set aside.

2-22. MOVEMENT OF DISTRIBUTION POINTS (CONT)

NOTE

Perform step 6 if model 1955-1 hypochlorination unit was used with distribution point.

6 Following steps below, clean plastic reservoir on 1955-1 hypochlorination unit:


RESERVOIR COVER
RESERVOIR FILL HOSE
SUCTION HOSE
PLASTIC RESERVOIR

(a) Remove reservoir cover.

(b) Remove suction and reservoir fill hoses from reservoir.

(c) Remove and empty plastic reservoir on hypochlorination unit. Rinse reservoir and install on unit.

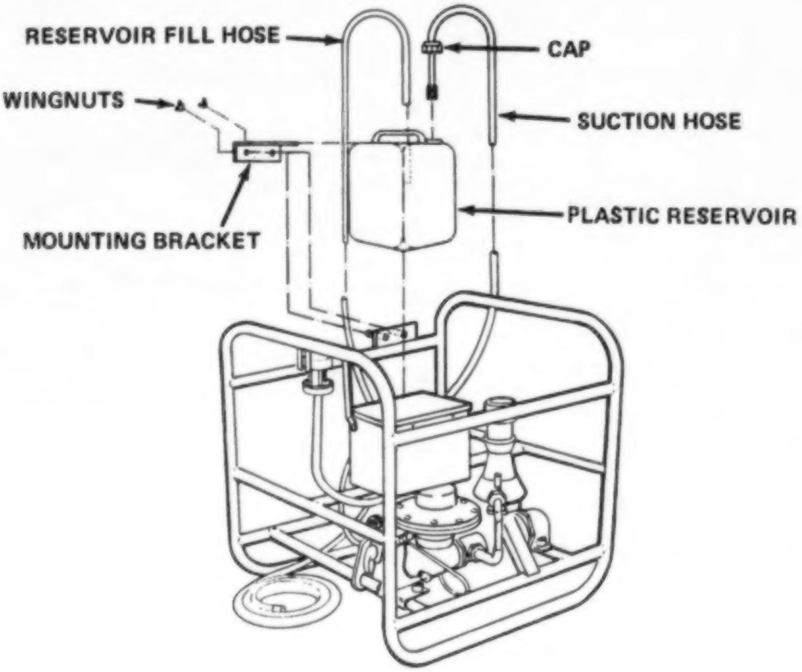
(d) Places hoses in reservoir. Install cover on reservoir.

2-22. MOVEMENT OF DISTRIBUTION POINTS (CONT)

NOTE

Perform step 7 if model A-506131 hypochlorination unit was used with distribution point.

7 Following steps below, clean plastic reservoir on A-506131 hypochlorination unit:


RESERVOIR FILL HOSE
CAP
WINGNUTS
SUCTION HOSE
MOUNTING BRACKET
PLASTIC RESERVOIR

(a) Loosen and remove cap on plastic reservoir.

(b) Remove suction and reservoir fill hoses from reservoir.

(c) Loosen hook-and-loop strap around plastic reservoir.

(d) Remove two wingnuts. Remove reservoir mounting bracket.

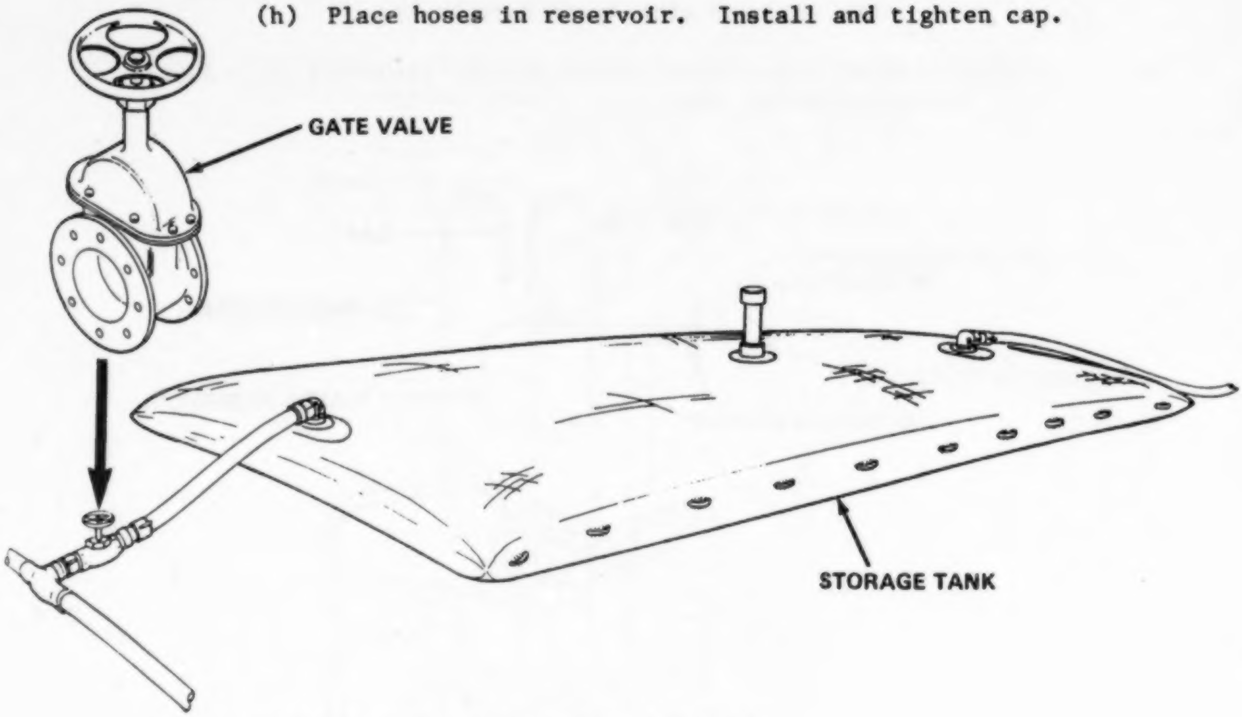
(e) Remove and empty plastic reservoir on hypochlorination unit. Rinse reservoir and install on unit.

(f) Install reservoir mounting bracket. Install and tighten two wingnuts.

2-22. MOVEMENT OF DISTRIBUTION POINTS (CONT)

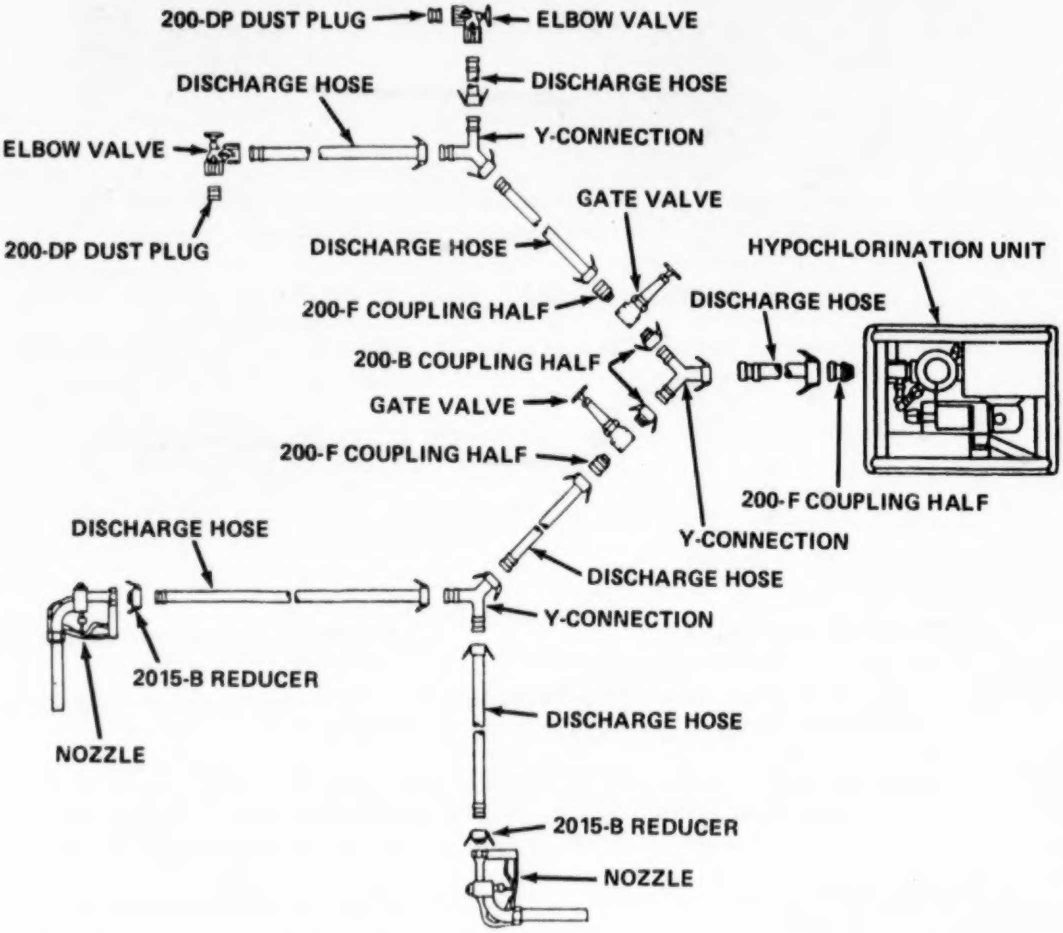
(g) Position and tighten hook-and-loop strap around plastic reservoir.

(h) Place hoses in reservoir. Install and tighten cap.



8 Close gate valve on storage assembly.

2-22. MOVEMENT OF DISTRIBUTION POINTS (CONT)

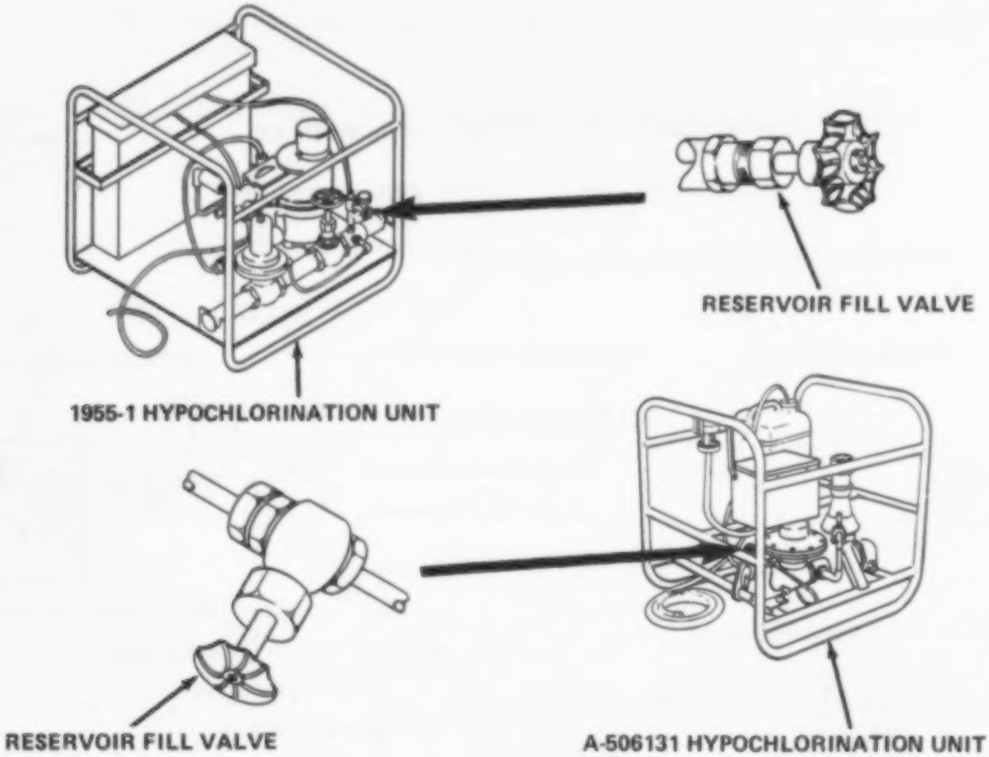

200-DP DUST PLUG
ELBOW VALVE
DISCHARGE HOSE
DISCHARGE HOSE
ELBOW VALVE
Y-CONNECTION
200-DP DUST PLUG
GATE VALVE
DISCHARGE HOSE
HYPOCHLORINATION UNIT
200-F COUPLING HALF
DISCHARGE HOSE
200-B COUPLING HALF
GATE VALVE
200-F COUPLING HALF
200-F COUPLING HALF
Y-CONNECTION
DISCHARGE HOSE
DISCHARGE HOSE
Y-CONNECTION
2015-B REDUCER
DISCHARGE HOSE
NOZZLE
2015-B REDUCER
NOZZLE

9 Push cam arms forward to open. Remove discharge hose attached to 200-F coupling half on hypochlorination unit outlet port.

10 Unscrew and remove 200-F coupling half from unit outlet port.

11 Start 125 gpm pump.

2-22. MOVEMENT OF DISTRIBUTION POINTS (CONT)


RESERVOIR FILL VALVE
1955-1 HYPOCHLORINATION UNIT
RESERVOIR FILL VALVE
A-506131 HYPOCHLORINATION UNIT

12 Open unit reservoir fill valve. Fill reservoir with water. When reservoir is full, close reservoir fill valve.

13 If model 1955-1 hypochlorination unit is used, perform steps 3 thru 9 of paragraph 2-16d. If model A-506131 hypochlorination unit is used, perform steps 3 thru 8 of paragraph 2-16e.

14 Allow unit to operate for 10 minutes to flush solution from parts and tubes. At the same time, continue to disconnect hoseline network.

15 Push cam arms forward to open. Remove two nozzles with attached reducers from ends of hoses.

16 Unscrew and remove two 2015-B reducers from ends of nozzles.

17 Push cam arms on discharge hose forward to open. Remove hose from end of Y-connection.

18 Push cam arms on Y-connection forward to open. Remove Y-connection from end of hose.

2-22. MOVEMENT OF DISTRIBUTION POINTS (CONT)

19 Push cam arms on discharge hose forward to open. Remove hose from 200-F male coupling half attached to gate valve.

20 Push cam arms on gate valve coupling half forward to open. Remove gate valve with attached coupling halves from end of Y-connection.

21 Remove 200-F and 200-B coupling halves from ends of gate valve.

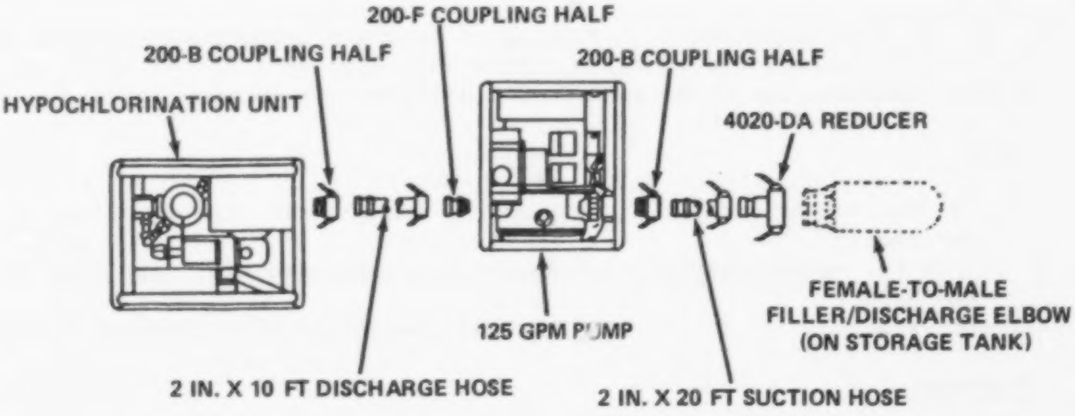
22 Push both sets of cam arms on elbow valves forward to open. Remove two 200-DP dust plugs from ends of elbow valves.

23 Remove elbow valves from ends of two hoses.

24 Repeat steps 16 thru 20 with second set of hoses, Y-connection, and gate valve.

25 Push cam arms on Y-connection forward to open. Remove Y-connection from end of hose.

26 Shut down 125 gpm pump.


200-F COUPLING HALF
200-B COUPLING HALF
200-B COUPLING HALF
HYPOCHLORINATION UNIT
4020-DA REDUCER
FEMALE-TO-MALE FILLER/DISCHARGE ELBOW (ON STORAGE TANK)
125 GPM PUMP
2 IN. X 10 FT DISCHARGE HOSE
2 IN. X 20 FT SUCTION HOSE

27 Push cam arms on inlet port coupling half forward to open. Remove end of hose from 200-B coupling half on inlet port of hypochlorination unit.

28 Remove 200-B coupling half from unit inlet port.

29 Install plastic dust caps on unit inlet and outlet ports.

30 Restart 125 gpm pump.

2-22. MOVEMENT OF DISTRIBUTION POINTS (CONT)

31 Drain storage tank as much as possible. When tank is drained, shut down 125 gpm pump. Continue disconnecting distribution point.

32 Push cam arms on discharge hose forward to open. Remove hose from 200-F coupling half on outlet port of pump.

33 Unscrew and remove 200-F coupling half from pump outlet port.

34 Push cam arms on inlet coupling half forward to open. Remove end of hose from 200-B coupling half on inlet port of pump.

35 Unscrew and remove 200-B coupling half from pump inlet port.

36 Push cam arms on discharge hose forward to open. Remove hose from 2 in. end of 4020-DA reducer attached to filler/discharge elbow on storage tank.

37 Push cam arms forward to open. Remove 4020-DA reducer from elbow on tank.

c. Return to Service. See paragraph 2-10.

2-23. MOVEMENT OF STORAGE ASSEMBLIES

a. Packing Requirements. Packing of tank and components requires the tools and personnel listed below. Pack the components listed below in the STORAGE ASSEMBLY and TANK, FABRIC, COLLAPSIBLE, 20K GALLON crates.

Tools	Used To
1-1/4 in. socket wrench and handle	Remove 6 in. grooved pipe couplings
1-1/16 in. socket wrench and handle	Remove 4 in. grooved pipe couplings
Pipe wrench	Install components with threaded fittings

Personnel

Two required for assembly of storage assembly

2-23. MOVEMENT OF STORAGE ASSEMBLIES (CONT)

Components

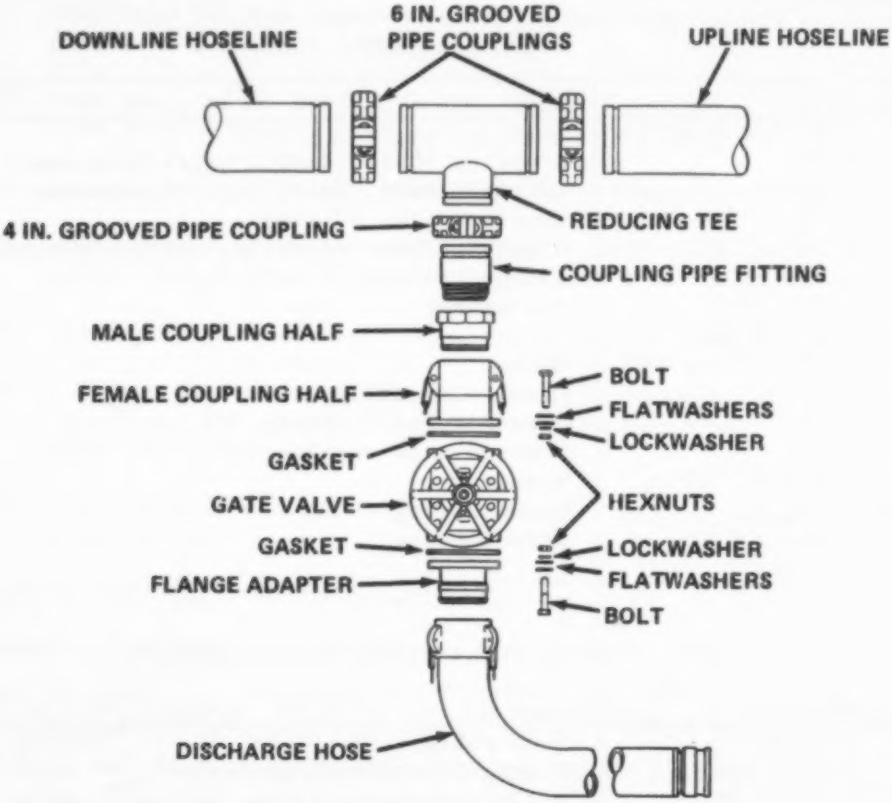
STORAGE ASSEMBLY Crate

Qty	Size	Item
16	UNC-2A x 3.25 in.	Bolt
1	4 in.	Coupling half, female, quick-disconnect
1	4 in.	Coupling half, male, quick-disconnect
1	4 in.	Coupling pipe fitting
4	4 in. x 10 ft	Discharge hose assembly, quick-disconnect
1	4 in.	Flange adapter
32	0.046 ID x 0.812 OD	Flatwasher
2	4 in., Class 150	Gasket
1	4 in.	Gate valve, flanged
1	4 in.	Grooved pipe coupling
1	6 in.	Grooved pipe coupling
16	0.375 16 UNC-2B	Hexnut
16	0.375 in.	Lockwasher
1	6 in. x 6 in. x 4 in.	Reducing tee

TANK, FABRIC, COLLAPSIBLE, 20K GALLON Crate

Qty	Size	Item
1	1/2 in.	Gate valve
1	20,000 gal	Storage tank, collapsible
1	4 in. x 90°	Filler/discharge elbow, male-to-female, quick-disconnect
1	4 in. x 90°	Filler/discharge elbow, female-to-female, quick-disconnect
1	3/4 in.	Suction hose
1		Vent assembly, quick-disconnect

2-23. MOVEMENT OF STORAGE ASSEMBLIES (CONT)


6 IN. GROOVED PIPE COUPLINGS
DOWNLINE HOSELINE
UPLINE HOSELINE
4 IN. GROOVED PIPE COUPLING
REDUCING TEE
COUPLING PIPE FITTING
MALE COUPLING HALF
FEMALE COUPLING HALF
BOLT
FLATWASHERS
LOCKWASHER
GASKET
GATE VALVE
HEXNUTS
GASKET
LOCKWASHER
FLATWASHERS
FLANGE ADAPTER
BOLT
DISCHARGE HOSE

b. Disassembly

NOTE

Set aside all removed components for repacking.

1 Remove grooved pipe coupling (para 2-19) connecting reducing tee to upline hoseline.

2 Install grooved pipe coupling (para 2-19) on end of hoseline segment.

3 Remove grooved pipe coupling (para 2-19) connecting reducing tee to downline hoseline.

4 Remove grooved pipe coupling (para 2-19) connecting coupling pipe fitting to reducing tee.

5 Remove reducing tee.

2-23. MOVEMENT OF STORAGE ASSEMBLIES (CONT)

6 Push cam arms on female coupling half forward to open. Remove male coupling half (with attached coupling pipe fitting) from female flanged quick-disconnect coupling half.

7 Unscrew male coupling half and remove from coupling pipe fitting.

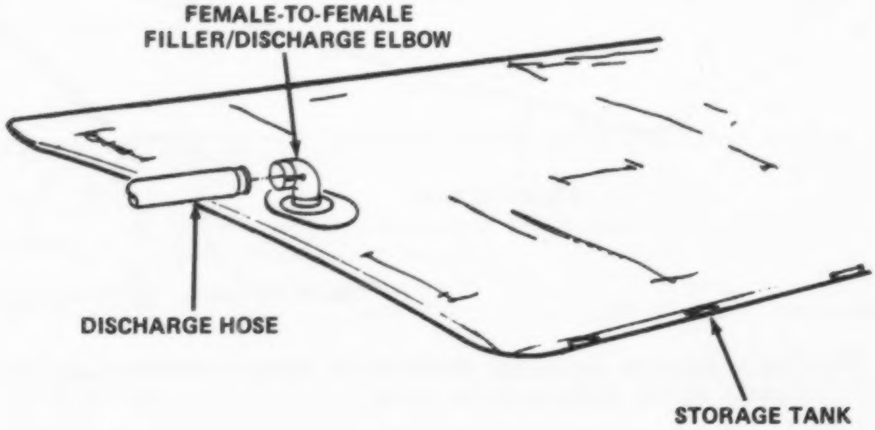
8 Push cam arms on hose forward to open. Remove flange adapter from end of discharge hose.

9 Remove 8 nuts, 16 flatwashers, and 8 bolts. Remove female flanged quick-disconnect coupling half from gate valve.

10 Carefully remove gasket.

11 Remove 8 nuts, 16 flatwashers, and 8 bolts. Remove flange adapter from gate valve.

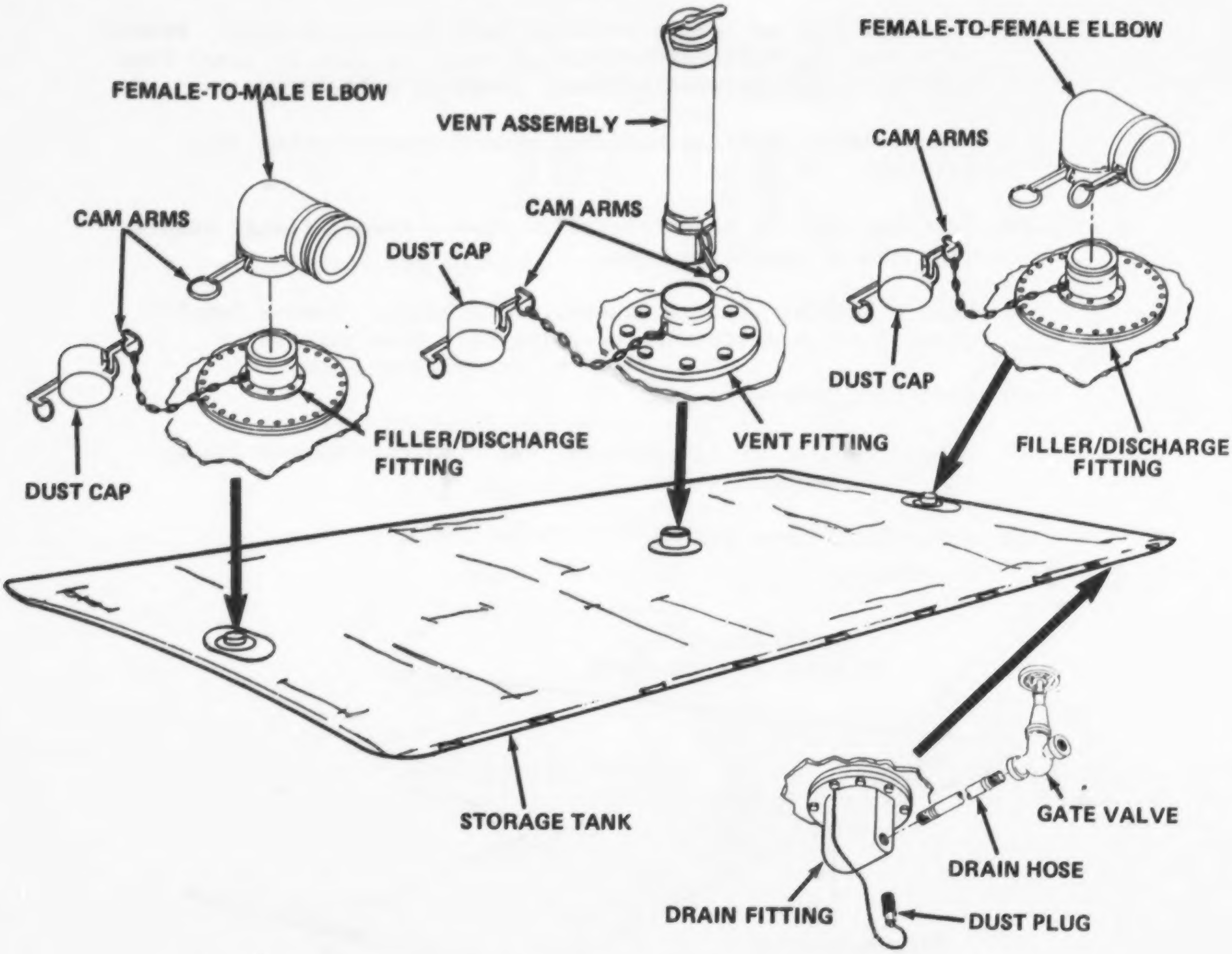
12 Carefully remove gasket.



13 Push cam arms forward to open. Remove first discharge hose from female-to-female filler/discharge elbow of storage tank.

14 Separate remaining discharge hoses.

2-23. MOVEMENT OF STORAGE ASSEMBLIES (CONT)


FEMALE-TO-MALE ELBOW
VENT ASSEMBLY
FEMALE-TO-FEMALE ELBOW
CAM ARMS
CAM ARMS
CAM ARMS
DUST CAP
DUST CAP
DUST CAP
FILLER/DISCHARGE FITTING
VENT FITTING
FILLER/DISCHARGE FITTING
STORAGE TANK
GATE VALVE
DRAIN HOSE
DRAIN FITTING
DUST PLUG

15 Push cam arms on elbow forward to open. Remove female-to-female elbow from storage tank.

16 Push cam arms on dust cap forward to open.

CAUTION

- To prevent leakage, close both cam arms at the same time.
- Do not strike cam arms to close. Damage to couplings could result.

17 Install dust cap on filler/discharge fitting on tank. Close cam arms.

2-23. MOVEMENT OF STORAGE ASSEMBLIES (CONT)

NOTE

Perform steps 18 thru 20 if female-to-male elbow was installed on tank.

18 Push cam arms on elbow forward to open. Remove female-to-male elbow from storage tank.

19 Push cam arms on dust cap forward to open.

CAUTION

- To prevent leakage, close both cam arms at the same time.
- Do not strike cam arms to close. Damage to couplings could result.

20 Install dust cap on filler/discharge fitting on tank. Close cam arms.

21 Push cam arms on vent assembly forward to open. Remove vent assembly.

CAUTION

- To prevent leakage, close both cam arms at the same time.
- Do not strike cam arms to close. Damage to couplings could result.

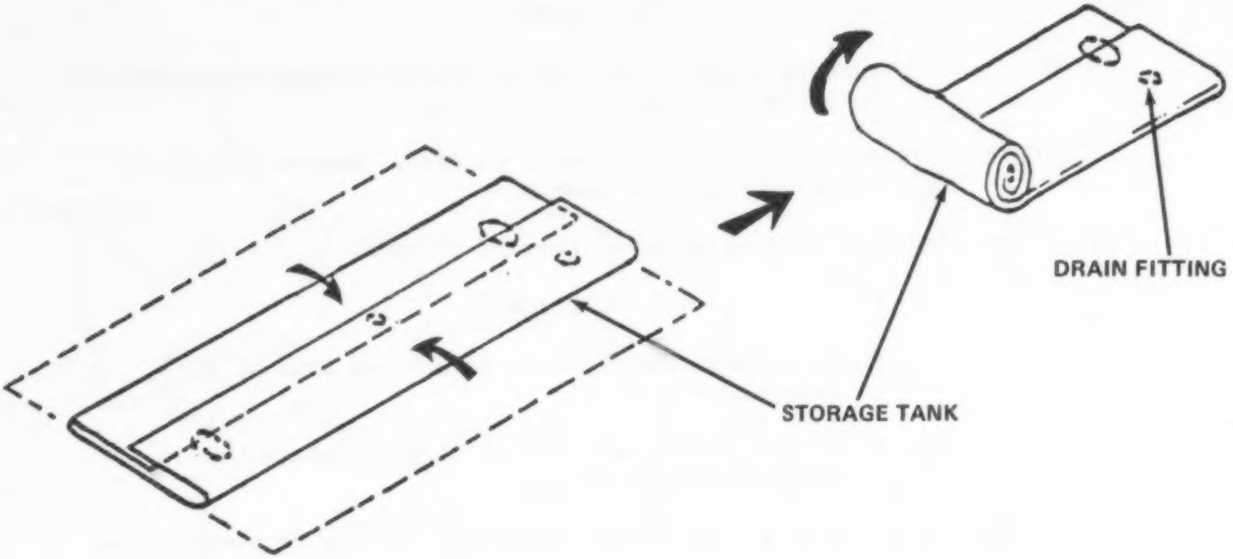
22 Install dust cap on vent fitting on tank. Close cam arms.

23 Unscrew and remove gate valve from drain hose on drain fitting.

24 Unscrew and remove drain hose from drain fitting and set aside.

25 Install dust plug in drain fitting.

2-23. MOVEMENT OF STORAGE ASSEMBLIES (CONT)



26 Fold in each side of tank 8 in. past center of tank. Width of tank when folded should be 11-1/2 ft.

27 Starting at end opposite drain fitting, roll tank. Do not roll too tightly.

CAUTION

DO NOT use rope to tie tank. Rope could rub against tank material and damage fabric.

28 Tie rolled tank in three places with cloth ties (item 15, appendix D).

c. Return to Service. See paragraph 2-9.

2-24. MOVEMENT OF 10-MILE HOSELINE SEGMENT

a. Disassembly and Packing Requirements

(1) Disassembly of the 10-mile hoseline segment requires sufficient tools, equipment, and personnel to perform the tasks outlined in paragraph 2-18. The displacement and evacuation kit, and the packing kit will be required to pack hoseline segments in flaking boxes. If a forklift is not available, the lifting sling will be required to load, unload, and stack flaking boxes.

(2) When flaking boxes are returned to packing site, stack them in groups of four. Pack each group in crate marked HOSE ASSEMBLY, 6 INCH, 500 FEET. (Number of groups packed in crates will depend on number of hoseline segments used during TWDS operation.) Listed below are the total number, size, and type of components packed in 10-MILE SEGMENT crate. Repack components that were removed for TWDS operation and/or disassembly.

10-MILE SEGMENT Crate

Qty	Size	Item
2		Displacement and evacuation kit
1	6 in.	End cap
1		Lifting sling
1		Packing kit
1		Pressure-reducing valve, skid-mounted
1	6 in.	Pressure relief valve and nipple
1		Repair kit
24	5 ft	Road crossing guard
5		Suspension kit
65	6 in.	Swivel joint

b. Disconnecting and Evacuating Hoseline

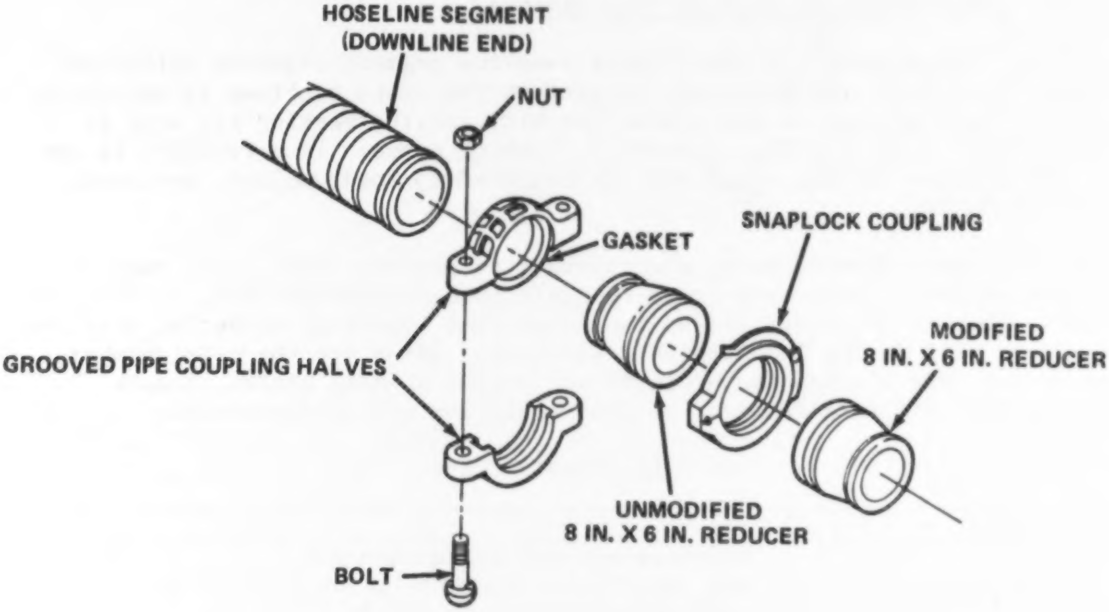
NOTE

Begin evacuating hoseline at lead pumping station and proceed downline.

1 Remove grooved pipe coupling (para 2-19) connecting end of hoseline segment to next downline hose segment (or swivel joint).

2 Separate two hoseline segments (or hoseline segment and swivel joint).

2-24. MOVEMENT OF 10-MILE HOSELINE SEGMENT (CONT)


HOSELINE SEGMENT
(DOWNLINE END)
NUT
GASKET
SNAPLOCK COUPLING
MODIFIED
8 IN. X 6 IN. REDUCER
GROOVED PIPE COUPLING HALVES
UNMODIFIED
8 IN. X 6 IN. REDUCER
BOLT

3 Locate ball receiver, consisting of two 8 x 6 in. reducers. One reducer has been modified to prevent displacement ball from being ejected from ball receiver.

4 Place gasket (removed in step 1) over downline end of first hoseline segment, ensure that it does not overhang end of connection.

5 Aline 6 in. end of unmodified reducer with downline end of first hoseline segment. Slide gasket to center position between hoseline groove and reducer groove. No portion of gasket should overhang grooves.

6 Place coupling halves over gasket. Make sure keys on coupling halves are in grooves on hoseline and reducer.

7 Install two bolts. Place nuts on bolts and hand-tighten.

2-24. MOVEMENT OF 10-MILE HOSELINE SEGMENT (CONT)

CAUTION

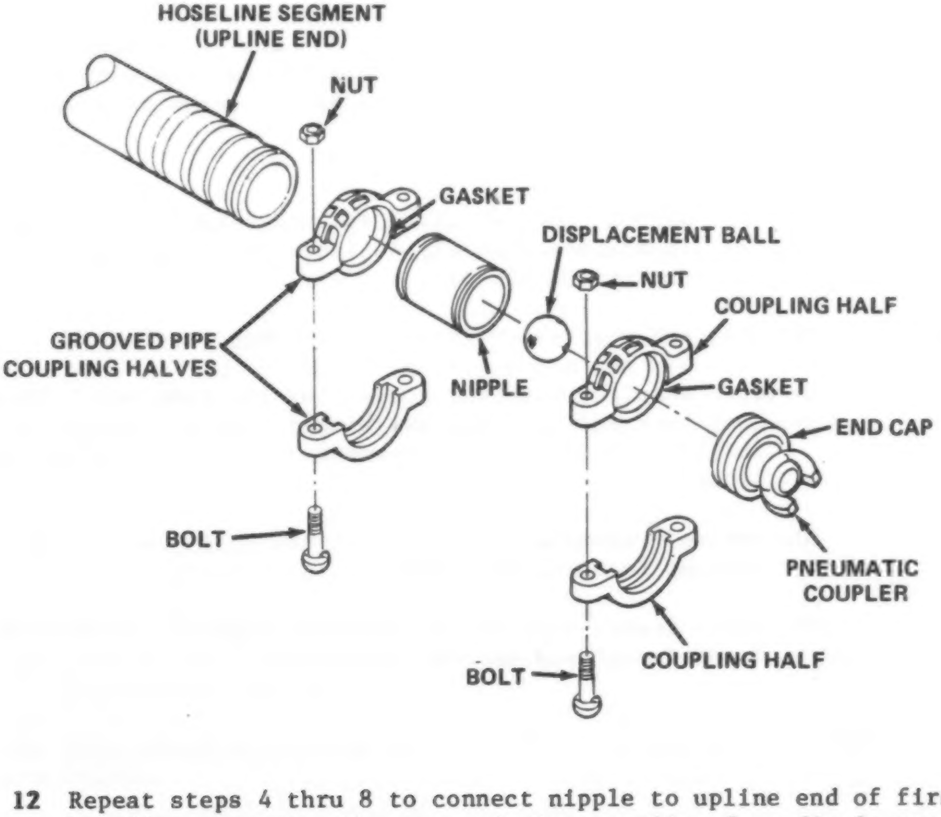
Overtightening nuts may cause gasket to pinch. Tighten nuts only until coupling halves are firmly together (metal-to-metal).

8 Tighten nuts alternately and equally until coupling halves are firmly together.

9 Locate 8 in. snaplock coupling. Open coupling.

10 Aline 8 in. end of modified reducer with 8 in. end of unmodified reducer.

11 Fit snaplock coupling halves over joined ends of reducers. Close coupling halves together over reducer ends. Lock coupling halves.


HOSELINE SEGMENT (UPLINE END)
NUT
GASKET
DISPLACEMENT BALL
NUT
COUPLING HALF
GROOVED PIPE COUPLING HALVES
NIPPLE
GASKET
END CAP
BOLT
PNEUMATIC COUPLER
COUPLING HALF
BOLT

12 Repeat steps 4 thru 8 to connect nipple to upline end of first hoseline segment. Use grooved pipe coupling from displacement and evacuation kit.

2-24. MOVEMENT OF 10-MILE HOSELINE SEGMENT (CONT)

13 Place displacement ball inside nipple.

14 Locate UF-100-B pneumatic coupler and modified end cap (with tapped hole). Attach pneumatic coupler to end cap.

15 Repeat steps 4 thru 8 to connect end cap with pneumatic coupler to end of nipple. Use 6 in. grooved pipe coupling from displacement and evacuation kit.

WARNING

Stand clear of receiver during displacement process. Hoseline may jump when ball arrives at receiver.

16 Locate UM-100-B pneumatic coupler. Screw coupler into air compressor line.

17 Connect air compressor to pneumatic coupler on end cap. Pressurize hoseline to 80 to 90 psi. Displacement ball will be forced through hose, displacing any residual water. A sound will be heard when the ball reaches receiver.

NOTE

If ball gets stuck, straighten kinks in hoseline. It may be necessary to increase air pressure. Do not exceed 150 psi.

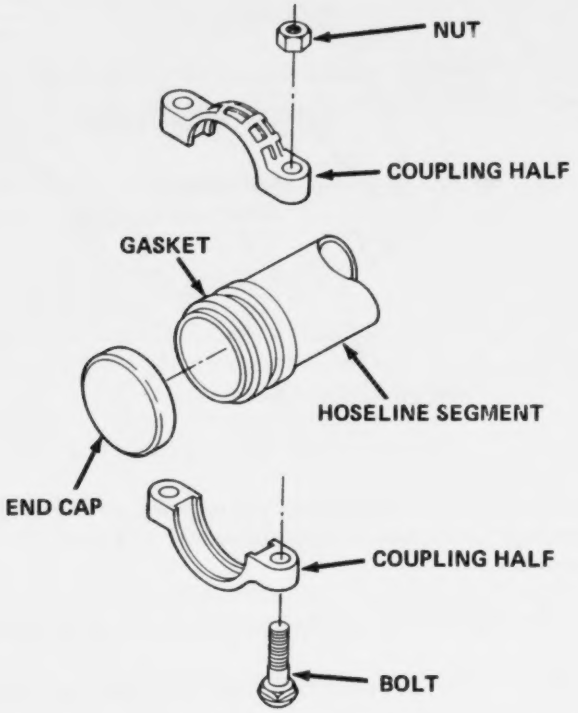
18 Shut off compressor when ball reaches receiver.

19 Open snaplock coupling connecting two reducers. Pull snaplock back and separate two hinged coupling halves. Set snaplock coupling, displacement ball, and modified reducer aside.

20 Remove grooved pipe coupling (para 2-19) connecting unmodified reducer to hoseline segment.

21 Place gasket over end of hoseline segment, being sure that it doesn't overhang end of connection.

2-24. MOVEMENT OF 10-MILE HOSELINE SEGMENT (CONT)



22 Locate end cap and aline it with end of hoseline segment. Slide gasket to center position between hoseline groove and end cap groove. No portion of gasket should overhang grooves.

23 Place coupling halves over gasket. Make sure coupling halves keys are in grooves on hoseline and end cap.

24 Install two bolts. Place nuts on bolts and hand-tighten.

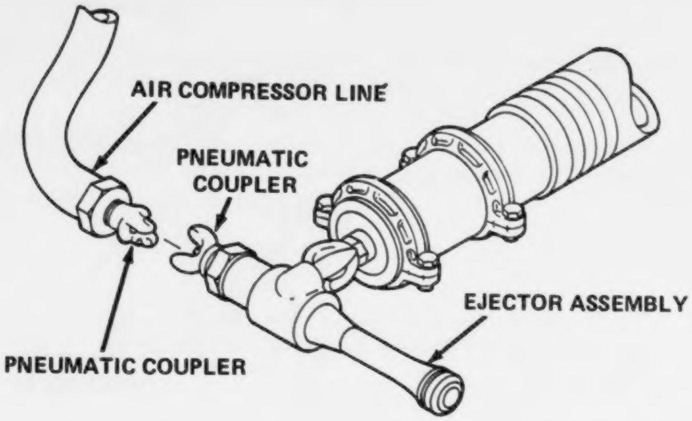
CAUTION

Overtightening nuts may cause gasket to pinch. Tighten nuts only until coupling halves are firmly together (metal-to-metal).

25 Tighten nuts alternately and equally until coupling halves are firmly together.

26 Disconnect air compressor line from end cap with pneumatic coupler.

2-24. MOVEMENT OF 10-MILE HOSELINE SEGMENT (CONT)



27 Locate ejector assembly and two UF-75-B pneumatic couplers. Install pneumatic couplers on threaded fittings on ejector assembly.

28 Install ejector assembly on end cap with pneumatic coupler.

29 Connect air compressor line to ejector assembly.

30 Apply air pressure to ejector assembly. Operate compressor for 10 minutes to collapse hoseline for repacking.

31 Turn off air compressor and disconnect air compressor line.

32 Disconnect ejector assembly and set aside.

33 Remove grooved pipe coupling (para 2-19) connecting end cap with pneumatic coupler to nipple.

34 Remove grooved pipe coupling (para 2-19) connecting nipple to hoseline segment.

35 Place gasket over end of hoseline segment, being sure that it does not overhang end of hose.

36 Aline end cap with hoseline segment. Slide gasket to center position between hoseline groove and end cap groove. No portion of gasket should overhang grooves.

37 Place coupling halves over gasket. Make sure coupling halves keys are in grooves on hoseline and end cap.

38 Install two bolts. Place nuts on bolts and hand-tighten.

2-24. **MOVEMENT OF 10-MILE HOSELINE SEGMENT** (CONT)

CAUTION

Overtightening nuts may cause gasket to pinch. Tighten nuts only until coupling halves are firmly together (metal-to-metal).

39 Tighten nuts alternately and equally until coupling halves are firmly together.

NOTE

End caps must be installed on collapsed hoseline to prevent hose from expanding before it is packed.

40 Repeat steps 1 thru 39 (omitting steps 14, 16, and 27) for each hoseline segment down the line.

41 When a hoseline length has been evacuated, collapsed, and capped, it is ready for packing in a flaking box.

42 When a swivel joint is removed, return it and one grooved pipe coupling to lead pumping station installation site.

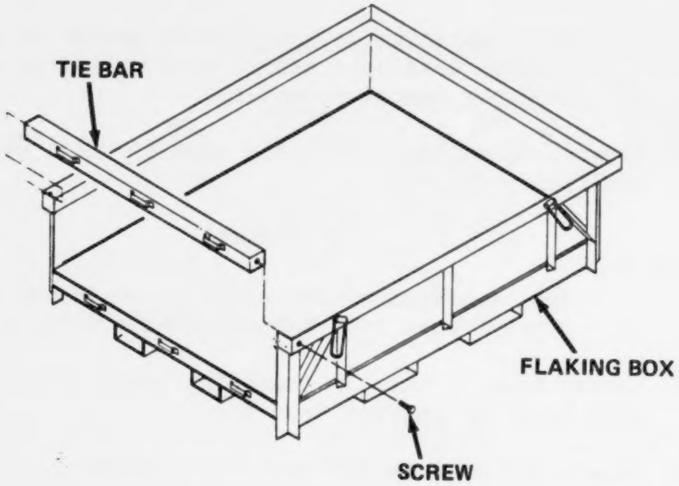
c. Repacking Hoseline Segments in Flaking Boxes

CAUTION

Clear sharp objects out of flaking box before packing. Any object pressed against hose during packing may puncture it.

1 Clean empty flaking box.

2-24. MOVEMENT OF 10-MILE HOSELINE SEGMENT (CONT)



2 Remove two screws on front of flaking box that secure tie bar to box.

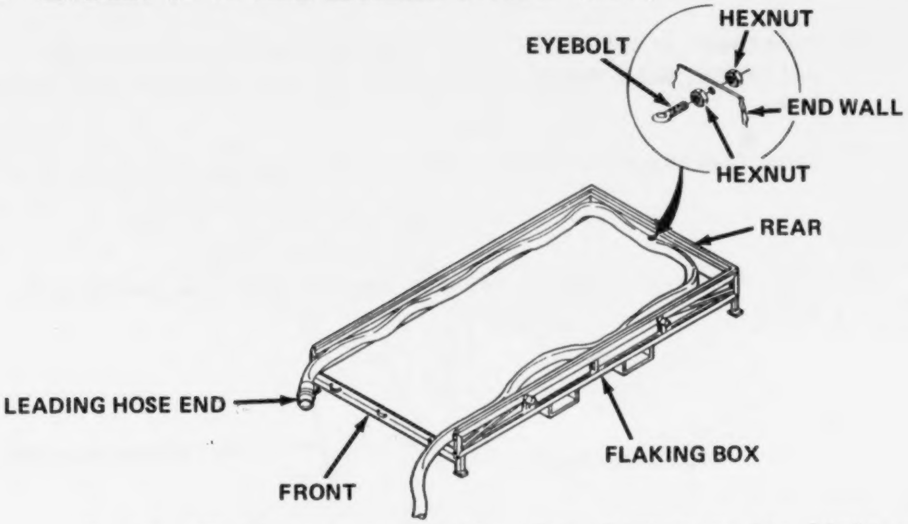
3 Lift and remove tie bar from box.

4 Perform step 1 of paragraph 2-11c to load empty flaking box on truck.

5 Transport empty flaking box and packing kit to leading end of first hoseline length.

6 Remove the following from packing kit: 2 hose-retaining clamps, 2 pullboard halves, 2 pullboard flanges, 1 coupling sleeve, 4 hexnuts, 12 flatwashers, 8 square-neck bolts, 2 capscrews, 10 self-locking nuts, and one 3/4-ton chain hoist.

2-24. MOVEMENT OF 10-MILE HOSELINE SEGMENT (CONT)

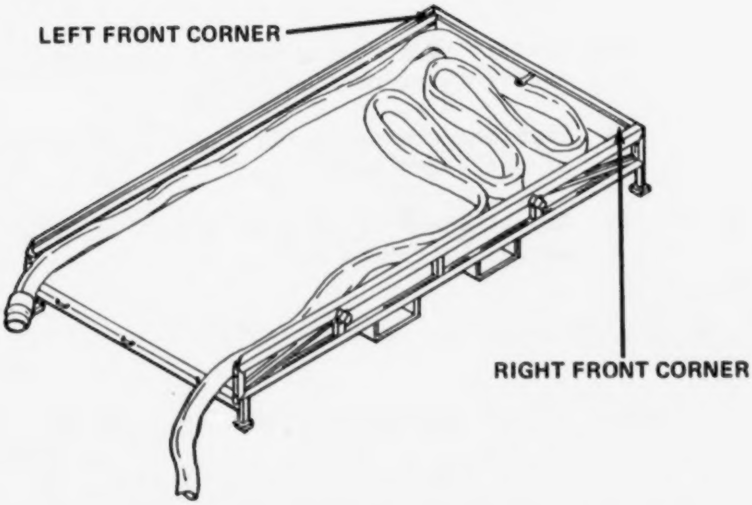

HEXNUT
EYEBOLT
END WALL
HEXNUT
REAR
LEADING HOSE END
FLAKING BOX
FRONT

7 Install hexnut on eyebolt. Turn hexnut to its limit of travel.

8 Place one eyebolt through hole in permanent end wall of flaking box. Place hexnut on eyebolt. Tighten nut until eyebolt is securely fastened to flaking box.

9 Place leading end of hose at left rear corner of flaking box. Leave about 3 ft of hose dangling beyond rear of box.

10 Route hose along left side and then across front of box.


LEFT FRONT CORNER
RIGHT FRONT CORNER

11 At right front corner of box, fold hose back to left front corner. Then fold hose back to right front corner.

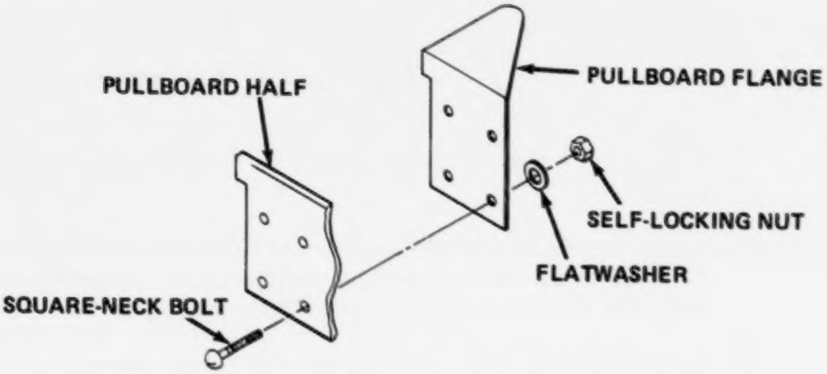
2-24. MOVEMENT OF 10-MILE HOSELINE SEGMENT (CONT)

12 Continue to fold hose in a right-to-left/left-to-right pattern. Make every other fold 1/2 in. shorter than width of box.

13 Stop flaking after about 150 ft of hose are in box.

NOTE

Steps 14 thru 22 are for assembly of the pullboard.


PULLBOARD HALF
PULLBOARD FLANGE
SELF-LOCKING NUT
FLATWASHER
SQUARE-NECK BOLT

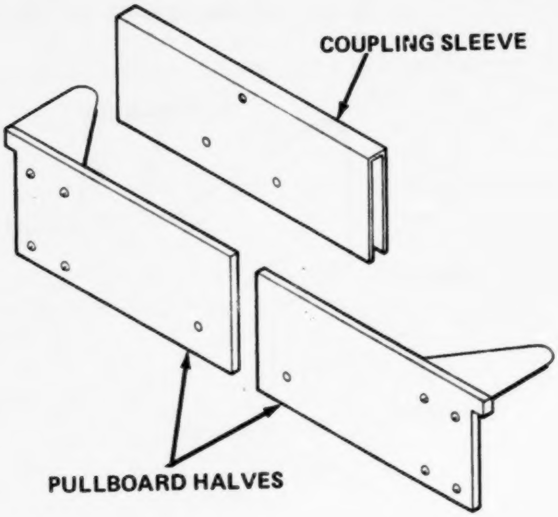
14 Aline holes on left pullboard flange with holes on pullboard half.

15 Install four square-neck bolts, four flatwashers, and four self-locking nuts in holes.

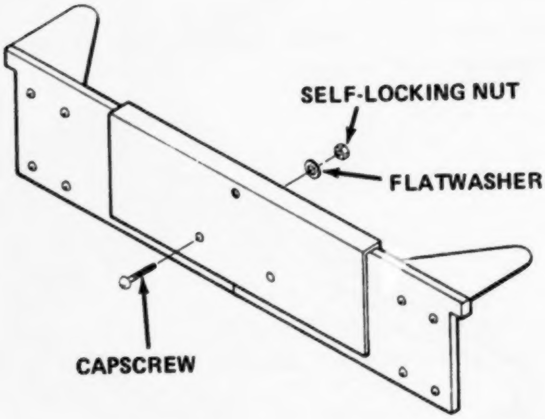
16 Tighten each nut until heads on bolts are flush with surface of pullboard half.

17 Repeat steps 14 thru 16 to install right pullboard flange on second pullboard half.

2-24. MOVEMENT OF 10-MILE HOSELINE SEGMENT (CONT)


COUPLING SLEEVE
PULLBOARD HALVES

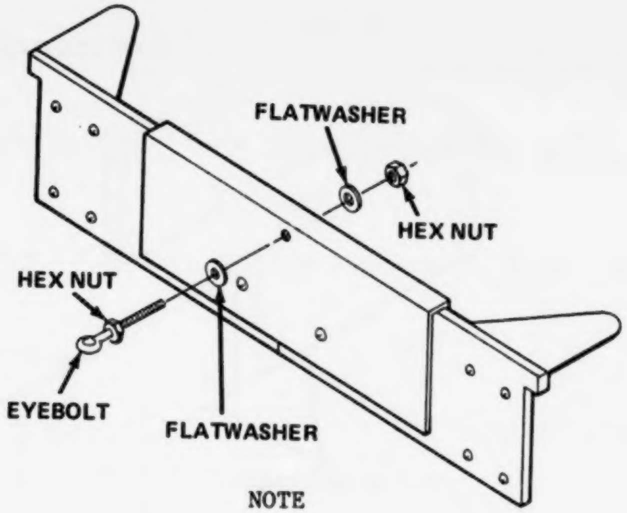
18 Place pullboard halves in coupling sleeve. Aline holes in pullboard halves with holes in coupling sleeve.


SELF-LOCKING NUT
FLATWASHER
CAPSCREW

19 Install two capscrews, two flatwashers, and two self-locking nuts in holes.

20 Tighten each nut until pullboard halves are firmly secured in coupling sleeve.

2-24. MOVEMENT OF 10-MILE HOSELINE SEGMENT (CONT)

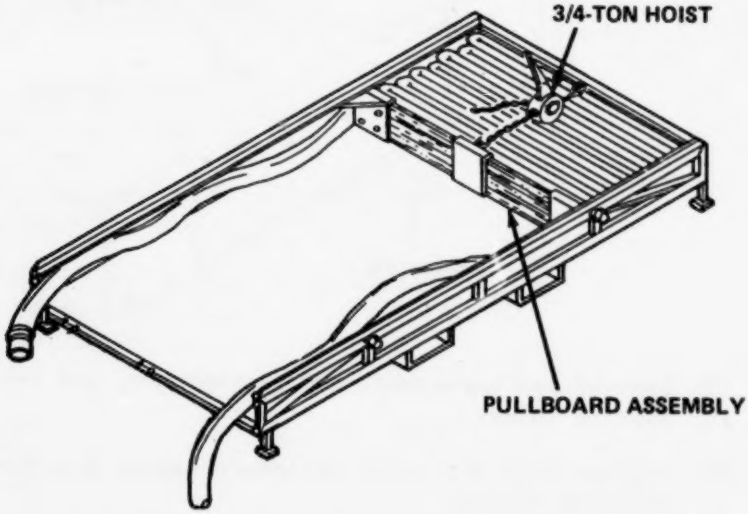

FLATWASHER
HEX NUT
HEX NUT
EYEBOLT
FLATWASHER

NOTE

When installing eyebolt through coupling sleeve, make sure eyebolt and flanges are on opposite sides of pullboard.

21 Install hexnut and flatwasher on eyebolt.

22 Place eyebolt through hole in top of coupling sleeve. Install flatwasher and hexnut.


3/4-TON HOIST
PULLBOARD ASSEMBLY

23 Place pullboard assembly against hose. Make sure eyebolt on pullboard faces eyebolt on front of box. Position pullboard flanges beneath metal rim on inside of flaking box.

2-24. MOVEMENT OF 10-MILE HOSELINE SEGMENT (CONT)

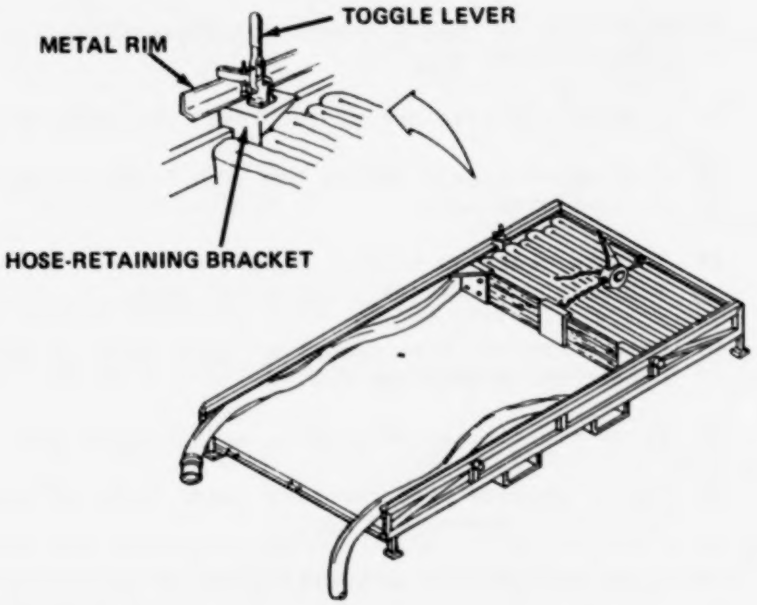
24 Attach hook on 3/4-ton hoist to eyebolt in front of box.

25 Attach hook on chain to eyebolt on pullboard assembly.

CAUTION

Be careful not to bend pullboard assembly when compressing hose.

26 Crank handle on hoist until hose is compressed into one-third of space in flaking box.



27 Place hose-retaining brackets one or two folds in front of pullboard. Position brackets on top of metal rim on inside of box.

28 Push up on toggle levers, locking brackets against metal rim on inside of box.

29 Release chain on hoist. Remove pullboard assembly from hoist.

30 Flake next 150 ft of hose into box. Repeating steps 23 thru 26, compress hose into two-thirds of space in box.

2-24. MOVEMENT OF 10-MILE HOSELINE SEGMENT (CONT)

31 Push down on toggle levers and remove hose-retaining brackets (installed in step 27).

32 Reinstall brackets one or two folds in front of pullboard.

33 Push up on toggle levers and lock brackets against metal rim on inside of box.

34 Release chain on hoist. Remove pullboard assembly from hoist.

35 Flake remaining hose into box. Repeating steps 23 thru 26, compress hose into remaining space in box.

36 Push down on toggle levers and remove hose retaining brackets (installed in step 32).

37 Install brackets one or two folds in front of pullboard.

38 Push up on toggle levers and lock brackets against metal rim on inside of box.

39 Release chain on hoist. Remove pullboard assembly from hoist. Set pullboard assembly and hoist aside.

40 Remove grooved pipe coupling (para 2-19) on leading end of hoseline. Remove end cap.

41 Place plastic cap on leading end of hoseline.

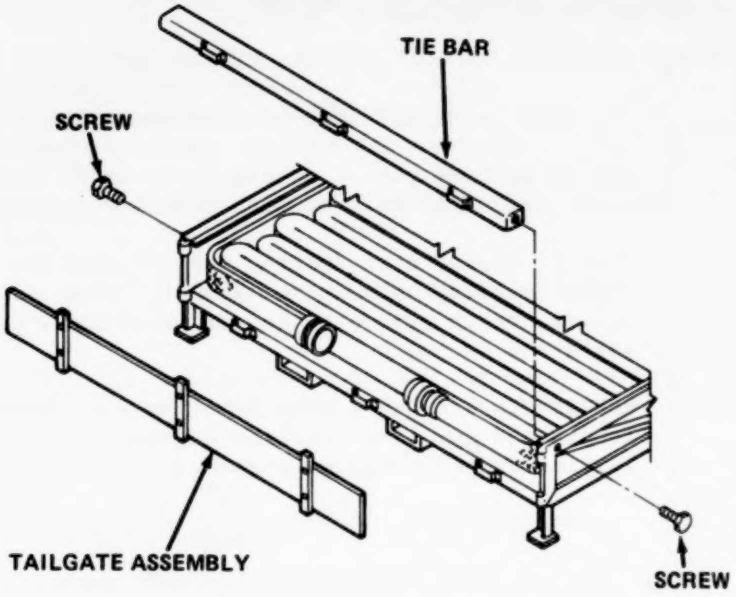
42 Remove grooved pipe coupling (para 2-19) on trailing end of hoseline. Remove end cap.

43 Place plastic cap on trailing end of hoseline.

44 Install grooved pipe coupling (para 2-19) on end of trailing end of hoseline.

45 Deliver end caps and grooved pipe coupling (removed in step 40) to crews evacuating hoseline.

2-24. MOVEMENT OF 10-MILE HOSELINE SEGMENT (CONT)



46 Fold ends of hoseline into flaking box.

47 Insert tailgate assembly into cleats on lower frame of flaking box.

48 Install tie bar on tailgate so that tailgate fits into cleats on tie bar.

49 Install two screws (removed in step 2) on rear of flaking box. Tighten two screws until tie bar is securely fastened to tailgate and box.

50 Push down on toggle levers and remove hose retaining brackets (installed in step 37).

51 Remove eyebolt and two nuts from rear of flaking box.

52 Load and nest empty flaking box on top of full box. Repeating steps 1 thru 51, pack next length of hoseline. Continue this procedure until all remaining lengths of hoseline have been packed.

53 As flaking boxes are packed, transport them to lead pumping station installation site for packing in crates.

2-24. MOVEMENT OF 10-MILE HOSELINE SEGMENT (CONT)

d. Disassembly of Suspension Devices

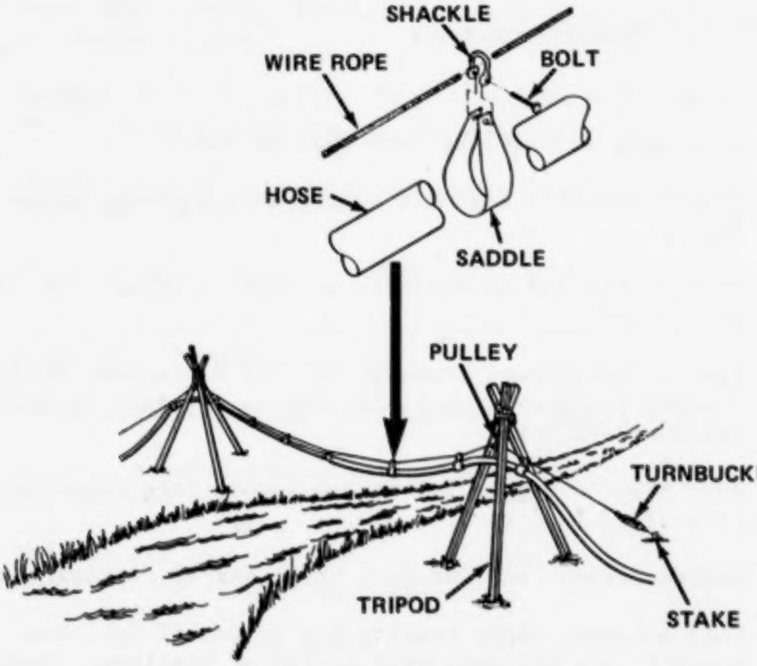
NOTE

Set aside all removed components for repacking.

1 Remove grooved pipe coupling (para 2-19) connecting upline hoseline length to suspended hoseline length.

2 Install gasket over leading end of suspended hoseline length. Place coupling halves over gasket. Make sure keys on coupling halves are in groove on end of hoseline segment. Install two bolts and two nuts.

3 Repeat steps 1 and 2 with trailing end of suspended hoseline length and downline hoseline segment. Install coupling on leading end of downline segment.



CAUTION

When removing saddle assemblies, manually support hose until assemblies have been removed.

4 Remove bolt, saddle, and shackle from each saddle assembly to outside of upline tripod.

2-24. MOVEMENT OF 10-MILE HOSELINE SEGMENT (CONT)

5 Install bolts through saddles and shackles.

6 Remove bolt, saddle, and shackle from each saddle assembly to outside of downline tripod.

7 Install bolts through saddles and shackles.

8 Pull hose across span. Saddles should drag with hose along wire rope.

9 As saddles arrive at pulley block on tripod tower, remove each one and reassemble it.

10 After all saddles have been removed and hose has been retrieved, loosen turnbuckles to release tension on wire rope.

11 Remove turnbuckles from ends of wire rope.

12 Remove turnbuckles from stakes. Remove stakes.

13 Pull wire rope across span and coil it.

14 Remove two nuts from each clamp assembly. Remove two nuts and one clamp from each U-bolt. Remove thimbles.

15 Install one clamp and two nuts on each U-bolt.

16 Remove pulley blocks from tripods.

17 Disassemble tripods.

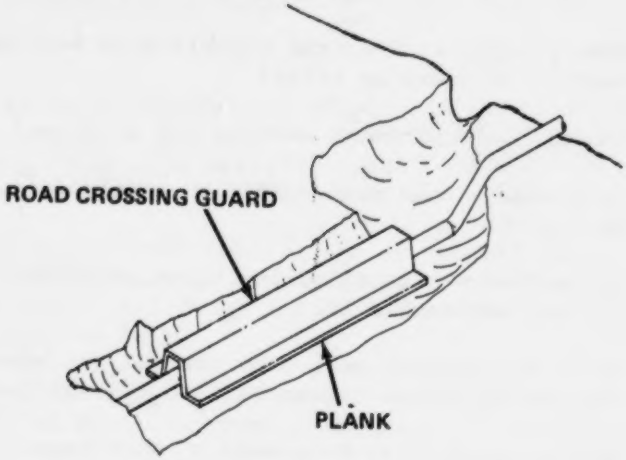
18 Locate chests for suspension kits and remove any contents.

19 Wipe out inside of chest and clean kit items.

20 Using loading diagram on chest lid, pack kit items as indicated.

21 Transport suspension kit chest to lead pumping station installation site for final packing.

2-24. MOVEMENT OF 10-MILE HOSELINE SEGMENT (CONT)



e. Disassembly of Road Crossing Guards

NOTE

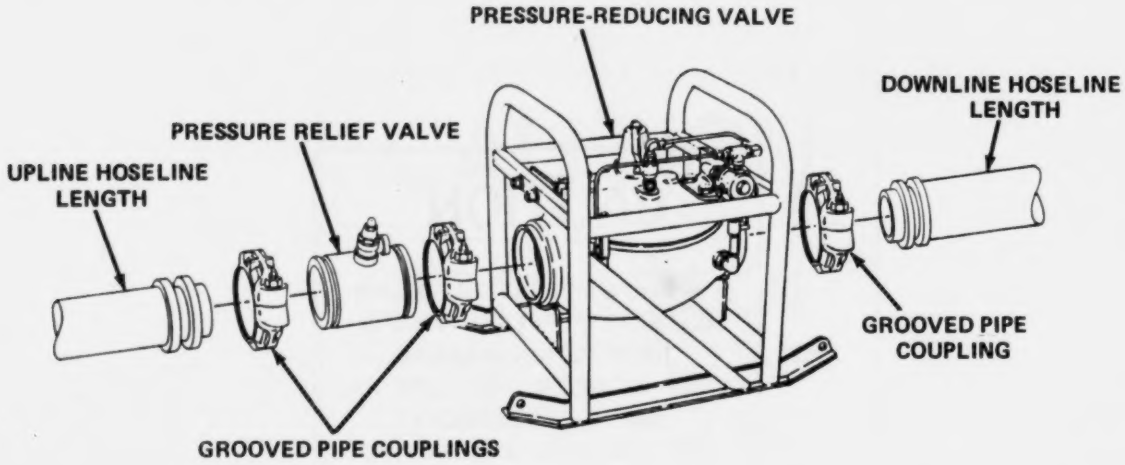
Road crossing guards should be removed and packed after buried hoseline has been pulled free from guards.

1 Dig out road crossing guards.

2 If planks were nailed to bottom of road crossing guards, remove nails. Remove planks.

3 Clean road crossing guards and transport them to lead pumping installation site for final packing.

2-24. MOVEMENT OF 10-MILE HOSELINE SEGMENT (CONT)


PRESSURE-REDUCING VALVE
DOWNLINE HOSELINE LENGTH
PRESSURE RELIEF VALVE
UPLINE HOSELINE LENGTH
GROOVED PIPE COUPLING
GROOVED PIPE COUPLINGS

f. Disassembly of Pressure-Reducing Valve

NOTE

Set aside all removed components for repacking.

1 Remove grooved pipe coupling (para 2-19) connecting pressure-reducing valve to downline hoseline segment.

2 Install grooved pipe coupling (para 2-19) on end of hoseline segment.

3 Remove grooved pipe coupling (para 2-19) connecting pressure relief valve to upline hoseline segment.

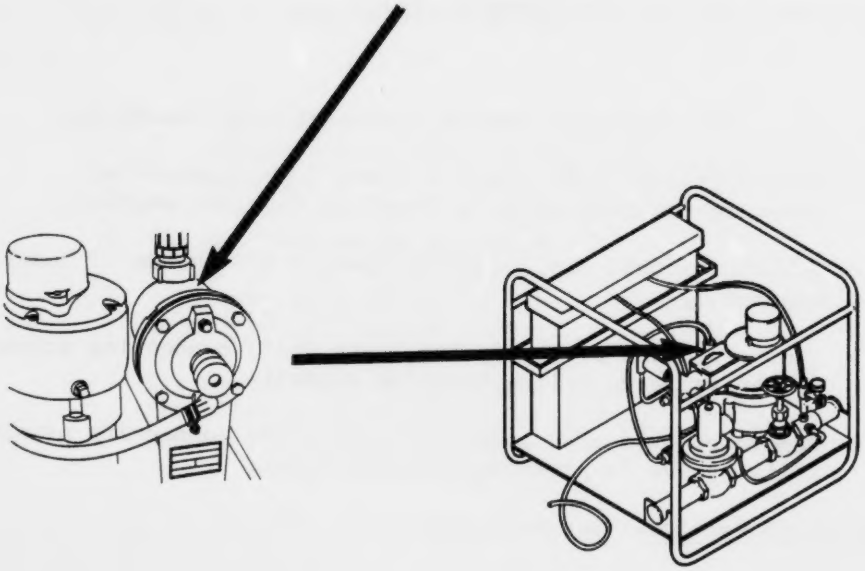
4 Remove grooved pipe coupling (para 2-19) connecting pressure relief valve to pressure-reducing valve.

g. Return to Service. See paragraph 2-11.

2-25. OPERATING INSTRUCTIONS ON DECALS AND INSTRUCTION PLATES

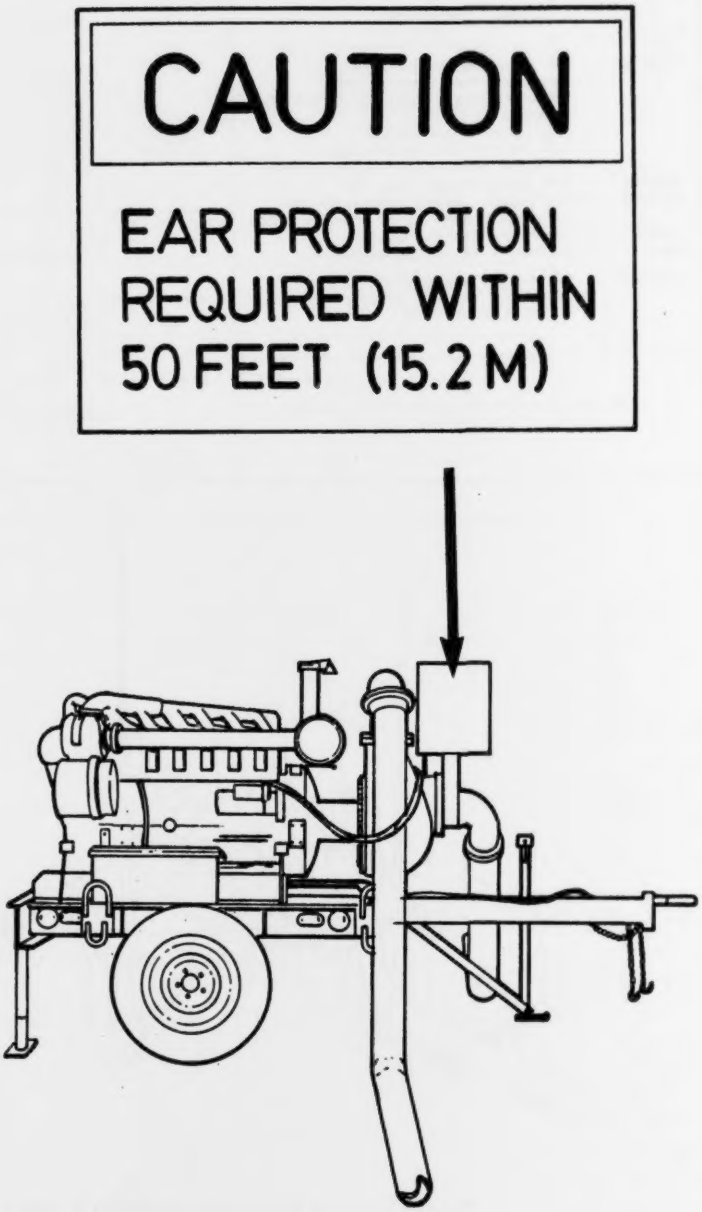
CAUTION

FOR SAFE OPERATION FOLLOW
ALL SAFETY PRECAUTIONS IN
INSTRUCTION MANUAL
LIQUID IS UNDER PRESSURE AND
MAY BE HAZARDOUS
USE PERSONAL PROTECTIVE
EQUIPMENT



HYPOCHLORINATION UNIT (1955-1)

2-25. OPERATING INSTRUCTIONS ON DECALS AND INSTRUCTION PLATES (CONT)



CAUTION

EAR PROTECTION
REQUIRED WITHIN
50 FEET (15.2 M)

TRAILER-MOUNTED PUMP ASSEMBLY (US636HCCD-1)

2-25. OPERATING INSTRUCTIONS ON DECALS AND INSTRUCTION PLATES (CONT)

ENGINE OPERATING INSTRUCTIONS

NORMAL OPERATION

STARTING — Set Pressure Regulator Switch To START
— Turn Electric Speed Control to IDLE
— Set Mode Switch to PRESSURE REGULATOR (NORMAL)
— Turn Manual Throttle FULL IN
— Push Fuel Rack FULL IN AND LOCK
— Set Engine Switch to START, Release to RUN
RUNNING (Electric) — Turn Manual Throttle FULL OUT
— Set Pressure Regulator Switch to Electric
— Turn Electric Speed Control to Desired SPEED
RUNNING (Auto) — Turn Manual Throttle FULL OUT
— Set Pressure Regulator Switch to AUTO

STOPPING — Turn Electric Speed Control to IDLE
— Set Pressure Regulator Switch to ELECTRIC
— Set Engine Switch to OFF

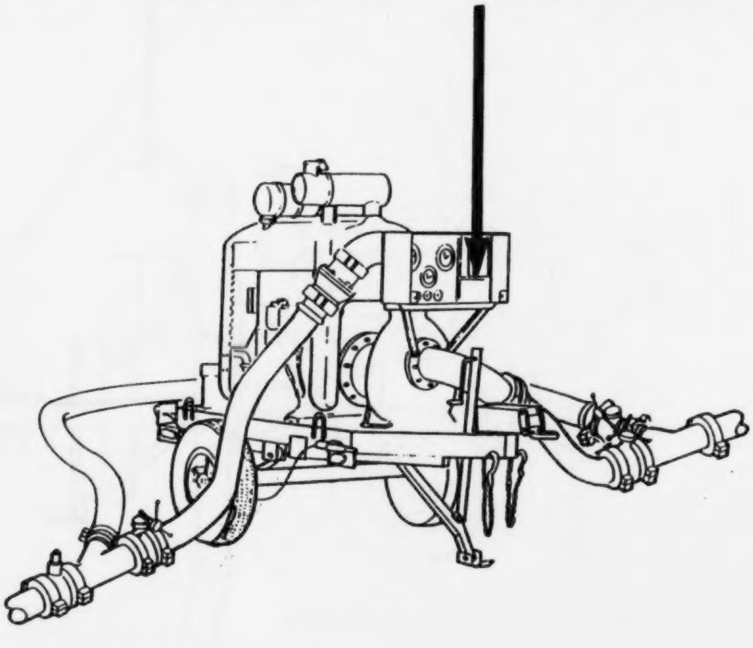
NOTE: Refer To Operation and Maintenance Manual For Detailed Instructions

MANUAL OPERATION

STARTING — Set Mode Switch to MANUAL THROTTLE
— Turn Manual Throttle FULL IN
— Pull Fuel Rack FULL OUT AND LOCK
— Set Engine Switch to START, Release to RUN
RUNNING — Turn Manual Throttle to Desired Speed
STOPPING — Turn Manual Throttle FULL IN
— Set Engine Switch to OFF

ALARM OPERATION

Alarm Horn Will Sound If:
— Engine Temperature Exceeds 220° F
— Engine Oil Pressure Below 10 P. S. I.
— Engine Not Started Within 30 Sec Of Initial Attempt
If Alarm Caused By High Temperature Or Low Oil Pressure
— Shutdown Engine And Consult Manual
— Reset Alarm By Turning Engine Switch OFF And Depressing Engine Alarm Pushbutton

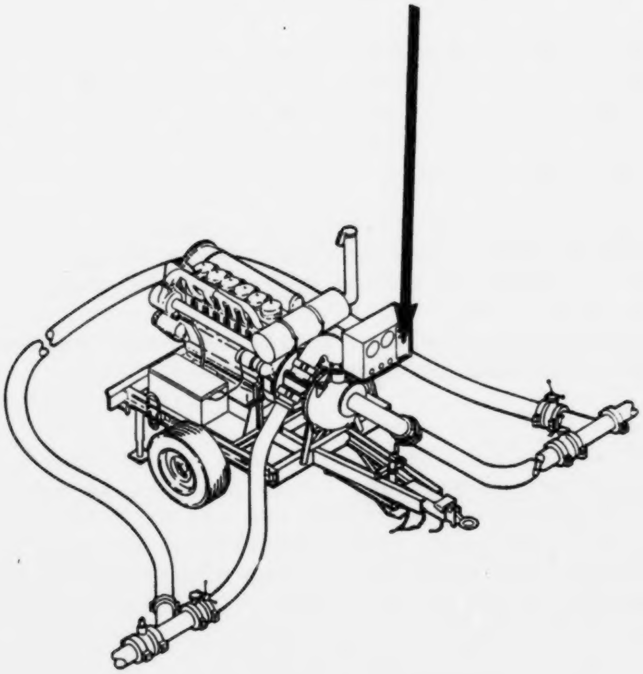


TRAILER-MOUNTED PUMP ASSEMBLY (UNIT 609)

2-25. OPERATING INSTRUCTIONS ON DECALS AND INSTRUCTION PLATES (CONT)

ENGINE OPERATION INSTRUCTIONS

MANUAL	NORMAL
STARTING: —SET MODE SWITCH TO MANUAL POSITION. —TURN MANUAL THROTTLE TO IDLE POSITION. —DEPRESS ENGINE OIL PRESSURE BY-PASS SWITCH LOCATED ON FACE OF OIL PRESSURE GAUGE. —PULL OUT START/STOP SWITCH. —DEPRESS START SWITCH.	STARTING: —FOLLOW SAME PROCEDURE AS MANUAL STARTING.
RUNNING: —TURN MANUAL THROTTLE TO DESIRED SPEED.	RUNNING: —TURN MANUAL THROTTLE TO HIGH POSITION. —TURN MODE SWITCH TO NORMAL POSITION.
STOPPING: —TURN MANUAL THROTTLE TO IDLE POSITION. —PUSH IN START/STOP SWITCH.	STOPPING: —TURN MANUAL THROTTLE TO IDLE POSITION. —TURN MODE SWITCH TO MANUAL POSITION. —PUSH IN START/STOP SWITCH.



TRAILER-MOUNTED PUMP ASSEMBLY (US636HCCD-1)

Section IV. OPERATION UNDER UNUSUAL CONDITIONS

2-26. OPERATION IN UNUSUAL WEATHER

a. Extreme Heat

(1) Trailer-Mounted Pump Assemblies. Make certain pump receives adequate ventilation for cooling engine. Make certain all shrouding is installed and in good condition. If using Unit 609, make sure coolant is at proper level. Use only correct lubricants for expected temperatures.

(2) Storage Tank. Protect tank either by placing it in shade or by covering it with leafy branches, camouflage net, shade cloths, tarpaulins, or a tent. Covering should be supported so that air may circulate around tank. Tank may also be cooled by covering with burlap or other fabric and soaking with water.

(3) Pressure-Reducing Valve. Cover unit with moistened burlap, tarpaulin, or suitable cover to shade it from sun.

b. Dusty or Sandy Conditions

(1) Trailer-Mounted Pump Assemblies. Protect pump from sand or dust as much as possible. Check service indicator on air cleaner frequently. Keep stores of oil and fuel tightly closed.

(2) Hypochlorination Units. Protect unit from sand or dust as much as possible. Be careful when mixing chlorine solution to prevent introduction of sand or grit in solution (para 2-16d or 2-16e).

c. Salt Water Area

(1) Trailer-Mounted Pump Assemblies. Check for rust formations weekly. Check all electrical contacts daily for evidence of corrosion. If these conditions are present, notify organizational maintenance.

(2) Pressure-Reducing Valve. Notify organizational maintenance if rust or aluminum oxide formations are present.

d. High Winds

(1) 10-Mile Hoseline Segment. Pack hoseline as soon as possible (para 2-12).

2-27. EMERGENCY PROCEDURES

a. General. Performance of the entire TWDS depends on continuous operation of each major component. In most cases, when part of the equipment fails, the entire system must be shut down. Procedures for partial operation are limited. The only emergency procedures possible are listed below. In all other situations, the entire TWDS must be shut down until problem is corrected.

b. Failure of Boost Pumping Station

CAUTION

> Do not attempt to operate other pumping stations when one unit fails. The bypass hose assembly is used only to keep downline pumps primed. Enough pressure will not exist to operate downline pumps, even at a partial rate.

1 Shut off engine (para 2-14).

2 Shut off water flow through malfunctioning pump. Close butterfly valves in suction and discharge lines.

3 Open butterfly valve in bypass line.

4 Notify operators at other pumping stations of equipment failure.

5 Operation of lead pump should be decreased (para 2-13). Discharge rate from lead pump should only be enough to keep downline pumps primed.

6 Boost pumps (operating in electric automatic mode) should decrease to idle automatically. Operators at boost pumping stations should make certain their units have adjusted properly. Operators must also monitor readings on pressure gages. Pumps that fail to remain primed must be shut off immediately (para 2-14).

7 Close gate valves connected to storage assemblies (para 2-15).

8 Distribution points may continue to operate as long as enough water remains in storage tanks. When water in storage tanks drops to inoperable level, shut down operation of distribution points (para 2-16a). Shut down engine on 125 gpm pump.

2-27. **EMERGENCY PROCEDURES** (CONT)

c. Failure of Storage Assembly. If storage assembly fails, TWDS operation is possible ONLY under the following conditions:

(1) Two storage assemblies are in use, and

(2) The unaffected storage assembly is being used with a distribution point.

To temporarily adapt TWDS operation, proceed as follows:

1 Close gate valve connected to defective storage tank (para 2-15).

2 If distribution point is being used with defective storage tank, shut down distribution point (para 2-16a). Shut down engine on 125 gpm pump.

3 Notify operators at other stations of equipment failure. Pumps may require adjustment (para 2-13 or 2-14).

d. Failure of Distribution Point. If a distribution point fails, TWDS operation is possible ONLY if two distribution points are in use. To temporarily adapt TWDS operation, proceed as follows:

1 Close gate valve connected to storage tank in use with defective distribution point (para 2-15).

2 Shut down operation of defective distribution point (para 2-16a). Shut down engine on 125 gpm pump.

3 Notify operators at other stations of equipment failure. Pumps may require adjustment (para 2-13 or 2-14).

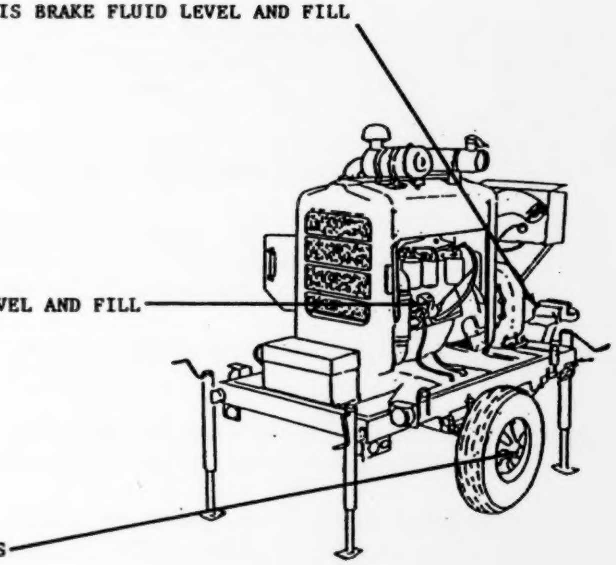
CHAPTER 3
MAINTENANCE INSTRUCTIONS

Section I. LUBRICATION INSTRUCTIONS

3-1. INTRODUCTION. Operator lubrication of the Tactical Water Distribution Equipment System (TWDS) Set 10-Mile Segment is restricted to adding oil to the two types of trailer-mounted pump assembly engines (Unit 609 and US636HCCD-1). See lubrication chart below.

TACTICAL WATER DISTRIBUTION EQUIPMENT SYSTEM (TWDS) SET
10-MILE SEGMENT (4320-01-122-3547, 4320-01-168-0591)

Reference: TM 5-4320-303-10: TM 5-4320-303-24



MAINTENANCE LEVEL	
O	TRAILER CHASSIS BRAKE FLUID LEVEL AND FILL (See Note 1)
C	ENGINE OIL LEVEL AND FILL (See Note 2)
O	WHEEL BEARINGS (See Note 3)

TRAILER-MOUNTED PUMP ASSEMBLY: UNIT 609

LUBRICANT USED TO PERFORM OPERATIONS ON THIS PAGE:	TOTAL MAN-HRS. for lube points
OE/HDO, BFS, GAA (SEE KEY)	

LUBRICATION

KEY

LUBRICANT/COMPONENTS	Refill Capacity	EXPECTED TEMPERATURES*		
		Above +32°F (Above 0°C)	+40°F to −10°F (+4°C to −23°C)	0°F to −65°F (−17°C to −53°C)
OE/HDO: Oil, ICE, Tactical MIL-L-2104 Engine	As Required	OE/HDO-30	TDS equipment is not designed to operate at temperatures below 32°F (0°C)	
GAA: Grease, Automotive, and Artillery, MIL-G-10924 Wheel Bearings	As Required	ALL TEMPERATURES		
BFS: Brake Fluid, Silicone, Automotive, All Weather Operational and Preservative MIL-B-46176 Brake Master Cylinder	As Required			

NOTES:

1. TRAILER CHASSIS BRAKE FLUID LEVEL AND CHECK

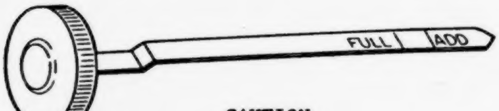
   Check brake fluid level semiannually. To check level, remove cover from master cylinder. Add fluid as required to bring level 1/4 in. from top of opening. Install master cylinder cover.

2. ENGINE OIL LEVEL AND FILL

   Check engine oil level daily before and after operating the engine. The engine must be on level ground to obtain an accurate oil level reading.

   Checking Procedure:

   a. Engine stopped. Check oil level. If oil level is between FULL and ADD marks, the engine is safe to operate.



CAUTION

Do not add oil past FULL level. Engine damage could occur.

   b. If oil level is below ADD mark, add oil as necessary to bring the level to the FULL mark.

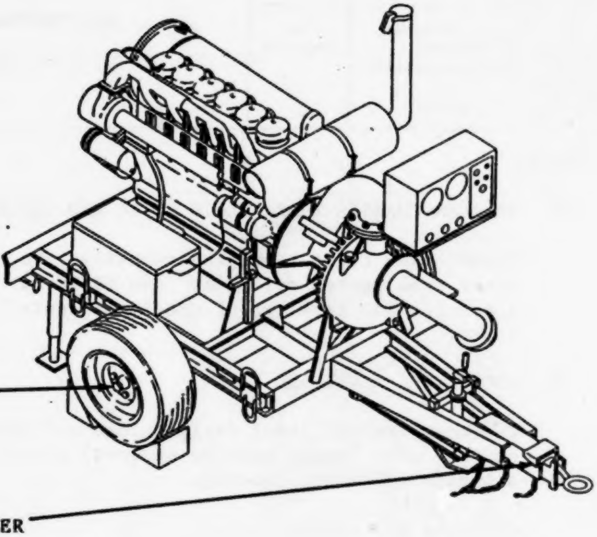
3. WHEEL BEARINGS

   Clean grease from bearings. Pack grease into bearing casings.

TACTICAL WATER DISTRIBUTION EQUIPMENT SYSTEM (TWDS) SET 10-MILE SEGMENT (4320-01-168-0590)

Reference: TM 5-4320-303-10: TM 5-4320-303-24

MAINTENANCE LEVEL



O WHEEL BEARINGS (See Note 4)

O BRAKE ACTUATOR ROLLER (See Note 5)

TRAILER-MOUNTED PUMP ASSEMBLY: US636HCCD-1

LUBRICANT USED TO PERFORM OPERATIONS ON THIS PAGE:

GAA (SEE KEY)

TOTAL MAN-HRS. for lube points

LUBRICATION

KEY

LUBRICANT/COMPONENTS	Refill Capacity	EXPECTED TEMPERATURES*		
		Above +32°F (Above 0°C)	+40°F to −10°F (+4°C to −23°C)	0°F to −65°F (−17°C to −53°C)
GAA: Grease, Automotive, and Artillery, MIL-G-10924 Wheel Bearings	As Required	ALL TEMPERATURES		

NOTES:

4. **WHEEL BEARINGS**

Clean grease from bearings. Pack grease into bearing casings.

5. **BRAKE ACTUATOR ROLLER**

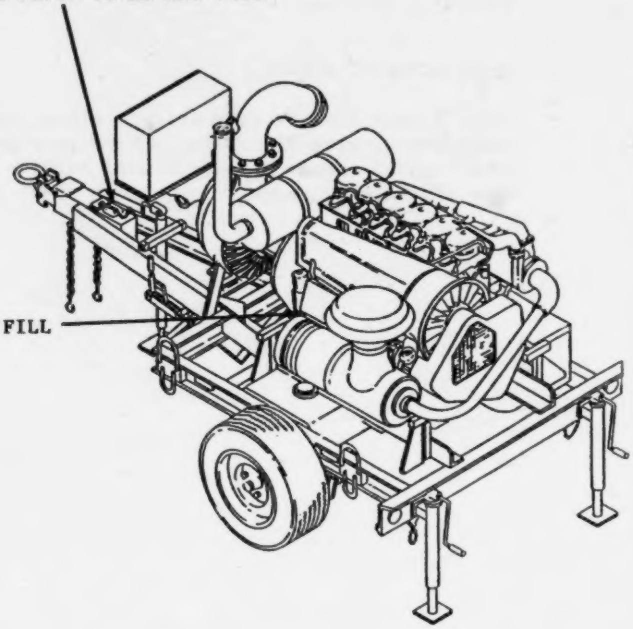
Clean grease from fitting using a clean, lint-free, dry cloth (appendix D, item 9). Using a hand pump grease gun, pump handle until grease appears around outside edges of roller. Wipe off excess grease.

TACTICAL WATER DISTRIBUTION EQUIPMENT SYSTEM (TWDS) SET 10-MILE SEGMENT (4320-01-168-0590)

Reference: TM 5-4320-303-10: TM 5-4320-303-24

MAINTENANCE LEVEL

O TRAILER CHASSIS BRAKE FLUID LEVEL AND FILL (See Note 6)



C ENGINE OIL LEVEL AND FILL (See Note 7)

TRAILER-MOUNTED PUMP ASSEMBLY: US636HCCD-1

LUBRICANT USED TO PERFORM OPERATIONS ON THIS PAGE:	TOTAL MAN-HRS. for lube points
BFS, GAA (SEE KEY)	

LUBRICATION

KEY

LUBRICANT/COMPONENTS	Refill Capacity	EXPECTED TEMPERATURES*		
		Above +32°F (Above 0°C)	+40°F to −10°F (+4°C to −23°C)	0°F to −65°F (−17°C to −53°C)
BFS: Brake Fluid, Silicone, Automotive, All Weather Operational and Preservative MIL-B-46176 Brake Master Cylinder	As Required	ALL TEMPERATURES		
OE/HDO: Oil, ICE, Tactical MIL-L-2104 Engine	As Required	OE/HDO-30	TWDS equipment is not designed to operate at temperatures below 32°F (0°C)	

NOTES:

6. TRAILER CHASSIS BRAKE FLUID LEVEL AND CHECK

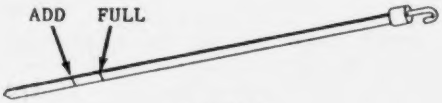
Check brake fluid level semiannually. To check level, remove cover from master cylinder. Add fluid as required to bring level 1/4 in. from top of opening. Install master cylinder cover.

7. ENGINE OIL LEVEL AND FILL

Check engine oil level daily before and after operating the engine. The engine must be on level ground to obtain an accurate oil level reading.

Checking Procedure:

a. Engine stopped. Check oil level. If oil level is between full and add marks, the engine is safe to operate.



CAUTION

Do not add oil past full level. Engine damage could occur.

b. If oil level is below add mark, add oil as necessary to bring the level to the full mark.

Section II. TROUBLESHOOTING PROCEDURES

3-2. INTRODUCTION

a. The table lists the common malfunctions which you may find during operation or maintenance of the TWDS or its components. You should perform the test/inspections and corrective actions in the order listed.

b. This manual cannot list all malfunctions that may occur, nor all tests or inspections and corrective actions. If a malfunction is not listed or is not corrected by listed corrective actions, notify your supervisor.

Table 3-1. Troubleshooting

MALFUNCTION
    TEST OR INSPECTION
        CORRECTIVE ACTION

PUMPING STATIONS

1. ENGINE WILL NOT START.

Step 1. Check fuel level gage to see if tank has enough fuel (item 15 or 32, table 2-1).

Add fuel.

Step 2. Check to see if primary fuel filter needs to be drained (item 7 or 43, table 2-1).

Drain filter.

2. ENGINE STOPS SUDDENLY.

Step 1. Check fuel level gage to see if tank has enough fuel (item 15 or 32, table 2-1).

Add fuel.

Step 2. Check to see if primary fuel filter needs to be drained (item 7 or 43, table 2-1).

Drain filter.

3. ENGINE HARD TO START.

Step 1. Check fuel level gage to see if tank has enough fuel (item 15 or 32, table 2-1).

Add fuel.

Table 3-1. Troubleshooting (Cont)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

Step 2. Check to see if primary fuel filter needs to be drained (item 7 or 43, table 2-1).

Drain filter.

Step 3. Check to see if air filter needs to be serviced (item 18 or 40, table 2-1).

Service filter (para 3-6).

4. **ENGINE TACHOMETER GAGE SHOWS LOW RPM.**

Step 1. Check to see if manual throttle or electric manual speed control is at correct setting (para 2-13 or 2-14).

Adjust throttle or speed control.

5. **ENGINE OIL PRESSURE GAGE SHOWS LOW OIL PRESSURE.**

Step 1. Check oil dipstick to see if oil level is too low (item 6 or 44, table 2-1).

Add oil as required.

6. **ENGINE ON UNIT 609 TRAILER-MOUNTED PUMP ASSEMBLY IS OVERHEATING.**

Step 1. Check to see if radiator fins are dirty, damaged, or leaking.

Stop engine (para 2-13 or 2-14). Clean dirty radiator fins. If radiator fins are damaged or leaking, notify organizational maintenance.

Step 2. Check to see if radiator hoses are damaged or leaking.

Stop engine (para 2-13 or 2-14) and notify supervisor.

Table 3-1. Troubleshooting (Cont)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

WARNING

Allow engine to cool before removing radiator cap. Heated coolant is under pressure and could explode, resulting in serious injury.

Step 3. Check to see if engine coolant is at proper level (item 12, table 2-1).

Add coolant as required (para 3-7).

7. ENGINE ON US636HCCD-1 TRAILER-MOUNTED PUMP ASSEMBLY IS OVERHEATING.

Step 1. Check to see if cooling air blower belt is improperly adjusted, damaged, or broken (item 38, table 2-1).

Notify supervisor.

Step 2. Check to see if cylinder cooling fins are clogged (item 39, table 2-1).

Remove obstructions.

8. ENGINE AMMETER SHOWS HIGH OR LOW RATE OF CHARGE.

Step 1. Check to see if battery connections are loose or corroded (para 3-5).

Clean and tighten connections as required.

Step 2. Check fluid level in battery cells (para 3-5).

Add fluid as required.

9. EXHAUST SMOKE EXCESSIVELY BLACK.

Step 1. Check oil dipstick to see if oil level is too low (item 6 or 44, table 2-1).

Add oil.

Step 2. Check to see if service indicator on air filter shows red (item 18 or 40, table 2-1).

Service air filter (para 3-6).

Table 3-1. Troubleshooting (Cont)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

Step 3. Check to see if primary fuel filter needs to be drained (item 7 or 43, table 2-1).

Drain filter.

10. PUMP SUCTION GAGE SHOWS LOW SUCTION PRESSURE.

Step 1. Check to see if butterfly valve in suction line is fully open.

Open butterfly valve (item 23 or 49, table 2-1).

NOTE

The following step applies only to boost pumping stations.

Step 2. Check to see if butterfly valve on bypass hose is fully closed.

Close butterfly valve (item 23 or 49, table 2-1).

NOTE

The following step applies only to lead pumping station.

Step 3. Check to see if Y-connection reducer is clogged with debris.

Clean Y-connection reducer.

Step 4. Check to see if suction hose or connections are leaking (item 24 or 50, table 2-1).

Tighten loose connections. If hose is leaking, notify supervisor.

Step 5. Check to see if suction hose has collapsed (item 24 or 50, table 2-1).

Stop engine (para 2-13 or 2-14) and notify supervisor.

Table 3-1. Troubleshooting (Cont)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

---

11. PUMP DISCHARGE GAGE SHOWS HIGH DISCHARGE PRESSURE.

Step 1. Check to see if butterfly valve in discharge line is fully open (item 24 or 50, table 2-1).

Open butterfly valve to maximum limit.

Step 2. Contact operators at downline pumping stations to see if station has been shut down.

Stop engine (para 2-13 or 2-14) and notify supervisor.

12. PUMP DISCHARGE GAGE SHOWS LOW DISCHARGE PRESSURE.

Step 1. Check to see if discharge hose or connections are leaking (item 24 or 50, table 2-1).

Tighten loose connections. If hose is leaking, notify supervisor.

Step 2. Check to see if downline hoseline segment or connection is leaking.

Tighten loose connection. If hoseline segment is leaking, notify supervisor.

13. RUNNING AND BRAKE LIGHTS DO NOT WORK.

Step 1. Check to see that electrical cable is securely fastened to mating receptacle on tow vehicle.

Secure connection.

STORAGE ASSEMBLIES

14. STORAGE TANK IS NOT BEING FILLED.

Step 1. Check to see if gate valve is closed or damaged (item 54, table 2-1).

Open gate valve. If valve is damaged, notify supervisor.

Step 2. Check to see if valve on drain assembly is open or damaged (item 56, table 2-1).

Close valve. If valve is damaged, notify supervisor.

Table 3-1. Troubleshooting (Cont)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

Step 3. Check to see if tank fabric is punctured, torn, or damaged (item 56, table 2-1).

Repair damaged area, then notify supervisor.

DISTRIBUTION POINTS

NOTE

For 125 gpm pump troubleshooting, see TM 5-4320-208-12&P.

15. HYPOCHLORINATION UNIT IS NOT INJECTING SOLUTION INTO WATER.

MODEL 1955-1

Step 1. Check to see if range adjusting valve is closed (para 2-16).

Open range adjusting valve.

Step 2. Check to see if solution reservoir is empty (item 63, table 2-1).

Add hypochlorite solution (para 2-16).

Step 3. Check to see if foot valve is clogged (item 69, table 2-1).

Clean foot valve.

Step 4. Check to see if hypochlorite feeder is air-bound.

Prime feeder (para 2-16).

MODEL A-506131

Step 1. Check to see if range adjusting valve is closed (para 2-16).

Open range adjusting valve.

Step 2. Check to see if solution reservoir is empty (item 63, table 2-1).

Add hypochlorite solution (para 2-16).

Step 3. Check to see if suction strainer is clogged (item 68, table 2-1).

Clean suction strainer.

Table 3-1. Troubleshooting (Cont)

MALFUNCTION
    TEST OR INSPECTION
        CORRECTIVE ACTION

Step 4. Check to see if HYPOCHLORITE SOLUTION DISCHARGE valve is closed (para 2-16).

Open valve.

Step 5. Check sight glass to see if solution is being injected by hypochlorinator (item 66, table 2-1).

Prime hypochlorinator (para 2-16).

Step 6. Check to see if tubing is loose, punctured, or leaking (item 62, table 2-1).

Secure loose tubing connections. If tubing is punctured, notify supervisor.

16. NO DISCHARGE OF WATER AT MANUAL DISBURSING STATIONS.

Step 1. Check to see if 125 gpm pump is working.

See TM 5-4320-208-12&P.

Step 2. Check to see if gate valves in hoseline network are closed (item 57, table 2-1).

Open gate valves.

Step 3. Check hoseline for loose connections and leakage (item 60, table 2-1).

Tighten loose connections. If hose is leaking, notify supervisor.

Section III. MAINTENANCE PROCEDURES

3-3. GENERAL. This section contains maintenance instructions authorized by the maintenance allocation chart (MAC) in TM 5-4320-303-24 and by the source, maintenance, and recoverability (SMR) coded items to support TWDS at the operator/crew maintenance level.

3-4. HOSELINE SEGMENT REPAIR

This task covers:

a. Flanged Adapter Repair

b. Double-Ended Adapter Repair

INITIAL SETUP

Used With

Pumping stations
10-mile hoseline segment

Tools

Repair kit, item 118, section II, appendix B

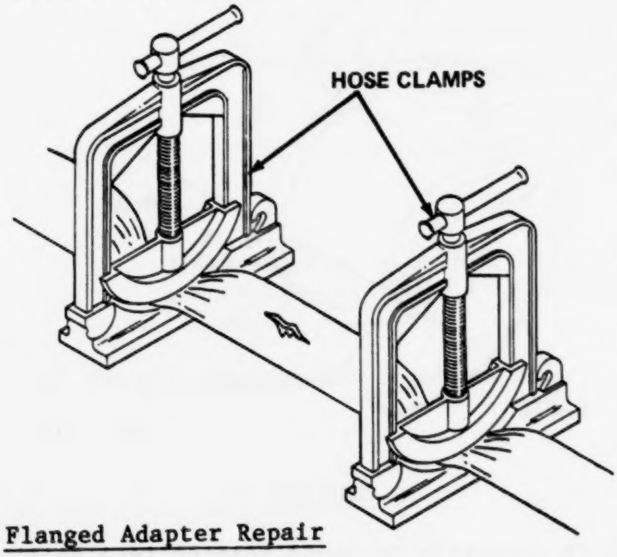
Supplies

Rags, item 9, appendix D

References

2-6 Grooved Pipe Coupling Installation

Equipment Condition Para	Condition Description
2-13/ 2-14	Pumping stations shut down.

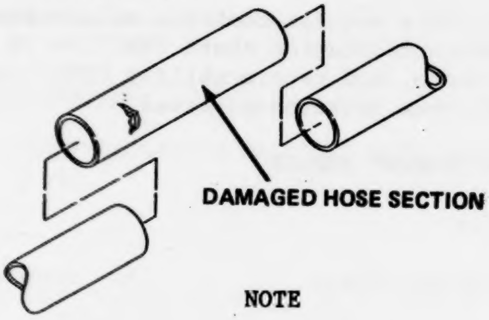


a. Flanged Adapter Repair

1 Install hose clamps 3 ft upline and downline from hose section to be removed.

2 Tighten hose clamps until hose is pinched closed.

3-4. HOSELINE SEGMENT REPAIR (CONT)



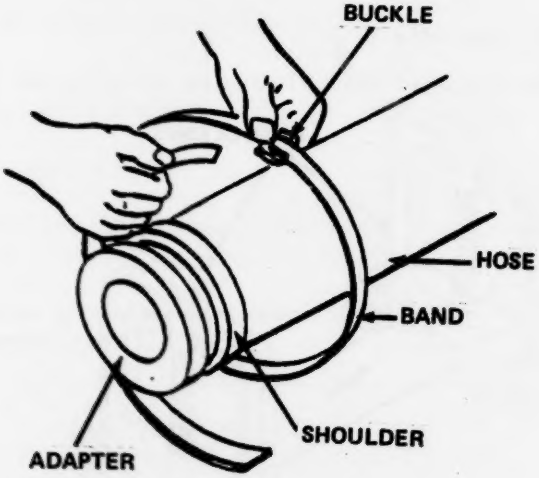
NOTE

Always mark, score, and cut hose squarely. Do not leave ragged or uneven edges.

3 Cut both sides of hose, 6 in. from leak. Remove damaged section of hose.

4 Inspect inside of hose ends for further damage. Cut hose back again, as required, to reach an undamaged area.

5 Drain hose ends and wipe dry.



CAUTION

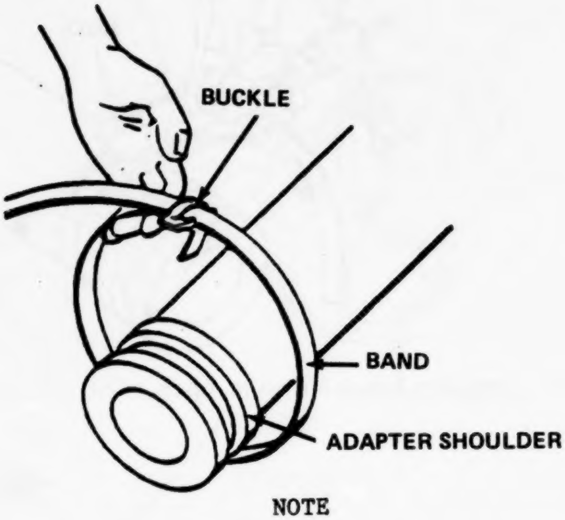
If it is necessary to pound adapter into hose, place wood block over sealing face of adapter or damage may result.

6 Insert flange-end of adapter into hose end, until shoulder is flush with hose end.

3-4. HOSELINE SEGMENT REPAIR (CONT)

7 Position band beneath hose end.

8 Place both ends of band through buckle.



NOTE

Double bands must be used to secure adapters on hoseline lengths.

9 Continue long end of band around hose and through buckle once more, forming a double band.

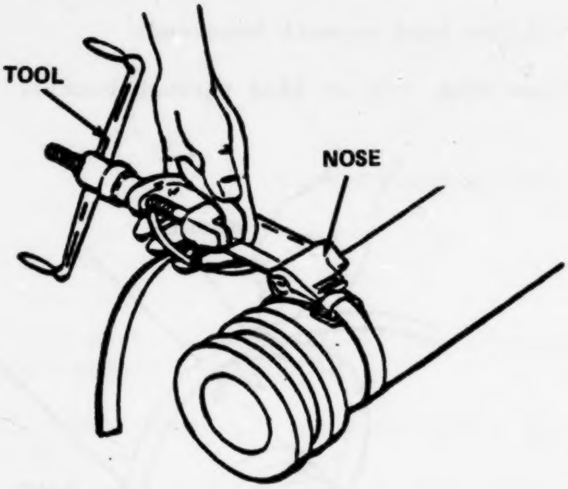
10 Position buckle so that it is on top of hoseline length. Bend end of band under buckle.

CAUTION

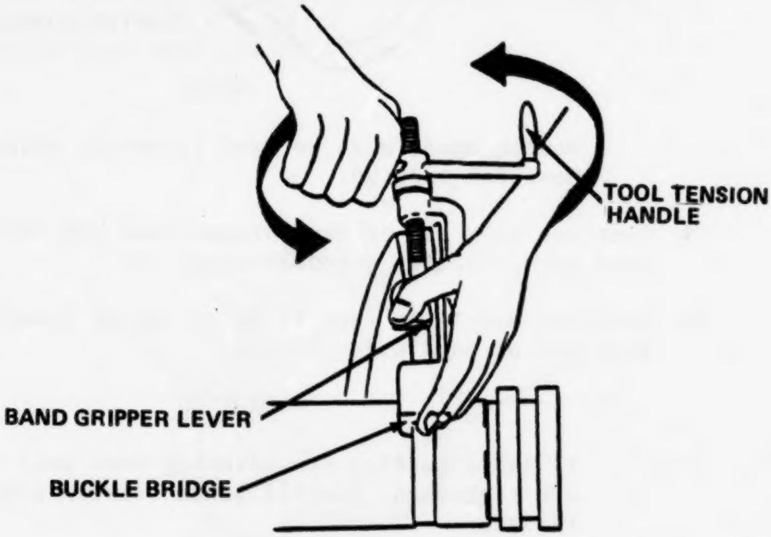
To avoid cutting or weakening hose wall when bands are tightened, install bands between adapter flanges.

11 Position band 4-7/8 in. from adapter shoulder.

3-4. HOSELINE SEGMENT REPAIR (CONT)



12 Install band through open slot of tool nose.


TOOL TENSION HANDLE
BAND GRIPPER LEVER
BUCKLE BRIDGE

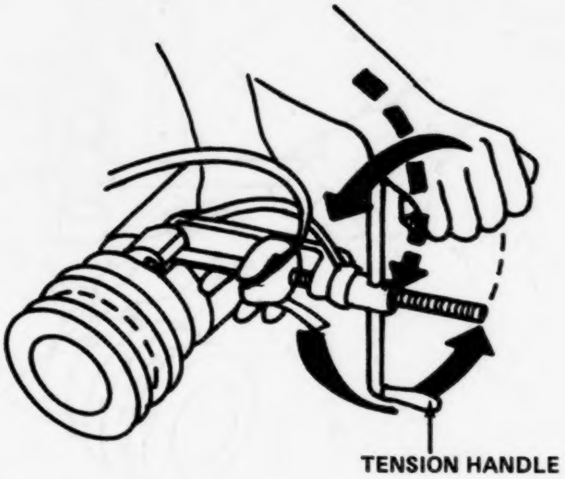
NOTE

After tension is created, it is not necessary to hold hand gripper, since it locks itself under tension.

13 With thumb on band gripper lever, apply tension by turning tool handle to the right.

14 Place finger on band at buckle bridge and continue to turn tool handle right. When band stops moving, stop turning handle.

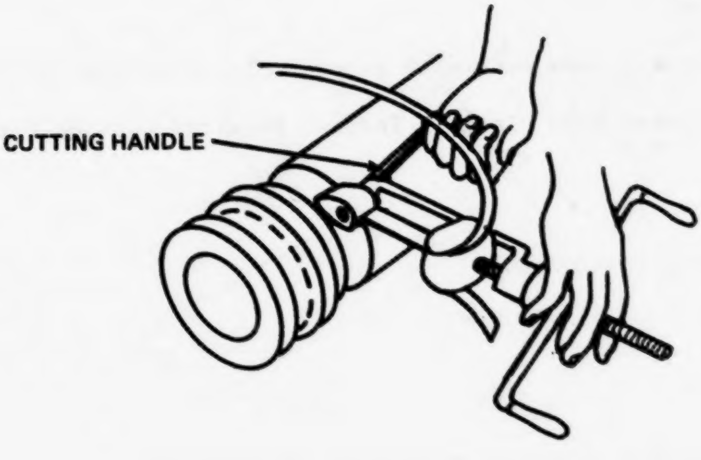
3-4. HOSELINE SEGMENT REPAIR (CONT)



CAUTION

To prevent breaking band, back off with tension handle throughout entire rolling procedure.

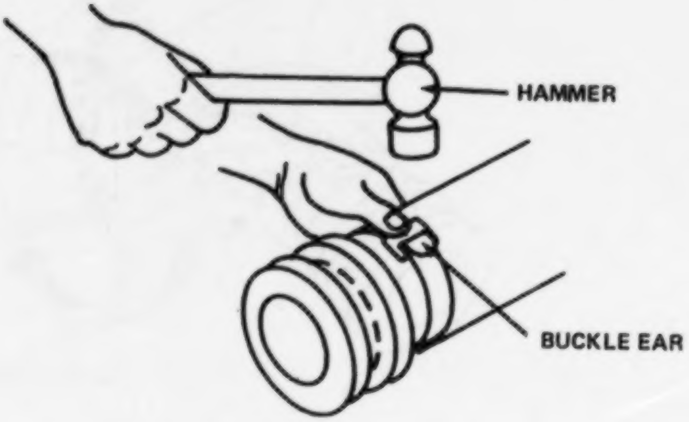
15 Roll tool over buckle, backing off with tension handle by turning left throughout entire course of roll.



16 Pull cutting handle and cut band.

3-4. HOSELINE SEGMENT REPAIR (CONT)

17 Holding stud of band with thumb, remove tool.



18 Clinch stub by hammering down buckle ears.

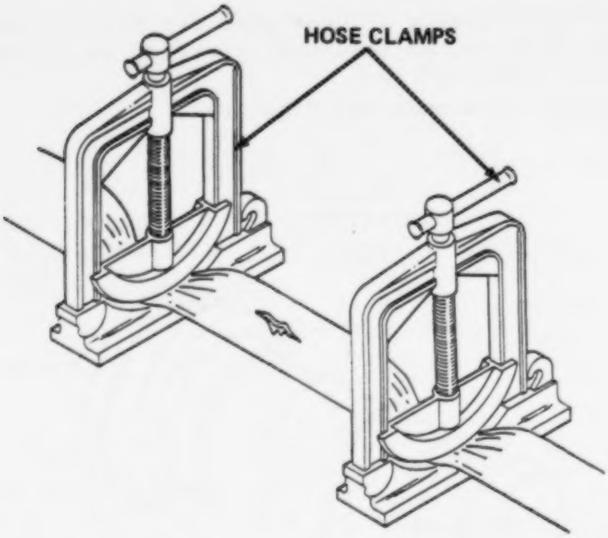
19 Repeating steps 7 thru 18, install a second band 3-3/8 in. from adapter shoulder and a third band 1-7/8 in. from adapter shoulder.

20 Repeating steps 6 thru 19, install adapter on second hose end.

21 Connect hose ends with grooved pipe coupling (para 2-6).

22 Release hose clamps. Inspect repaired section for leaks.

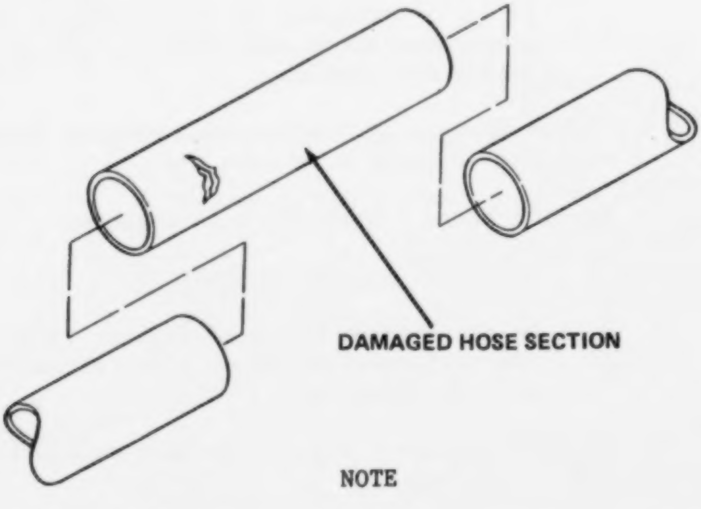
3-4. **HOSELINE SEGMENT REPAIR** (CONT)



b. Double-Ended Adapter Repair

1 Install hose clamps 3 ft upline and downline from hose section to be removed.

2 Tighten hose clamps until hose is pinched closed.



NOTE

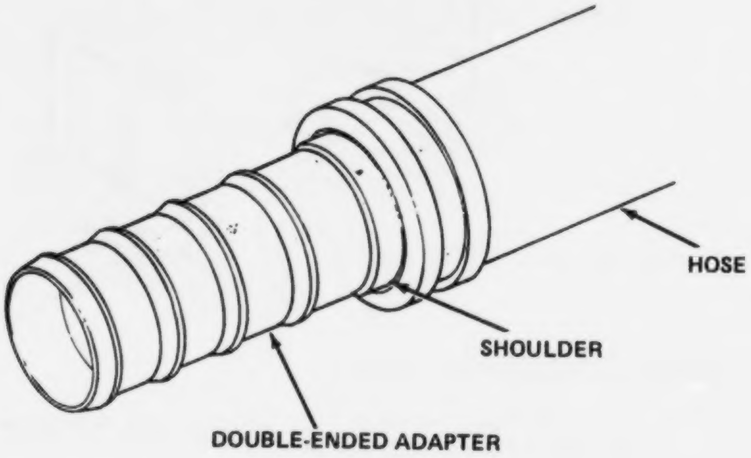
Always mark, score, and cut hose squarely. Do not leave ragged or uneven edges.

3 If leak is caused by a small puncture, cut both ends of hose at puncture. Otherwise, cut hose away from damaged section.

3-4. **HOSELINE SEGMENT REPAIR** (CONT)

4 Inspect inside of hose ends for further damage. Cut hose back again, as required, to reach an undamaged area.

5 Drain hose ends and wipe dry.



CAUTION

If it is necessary to pound adapter into hose, place wood block over sealing face of adapter or damage may result.

6 Insert one end of double-ended adapter into hose end, until shoulder is flush with hose end.

7 Perform steps 7 thru 19, task a above.

CAUTION

Do not attempt to pound adapter into second hose end or first section of hose (already installed) will be damaged.

8 Repeating steps 1 thru 7, install second hose end on other end of adapter.

9 Release hose clamps. Inspect repaired section for leaks.

3-5. BATTERY INSPECTION

This task covers:

a. Unit 609

b. US636HCCD-1

INTIAL SETUP

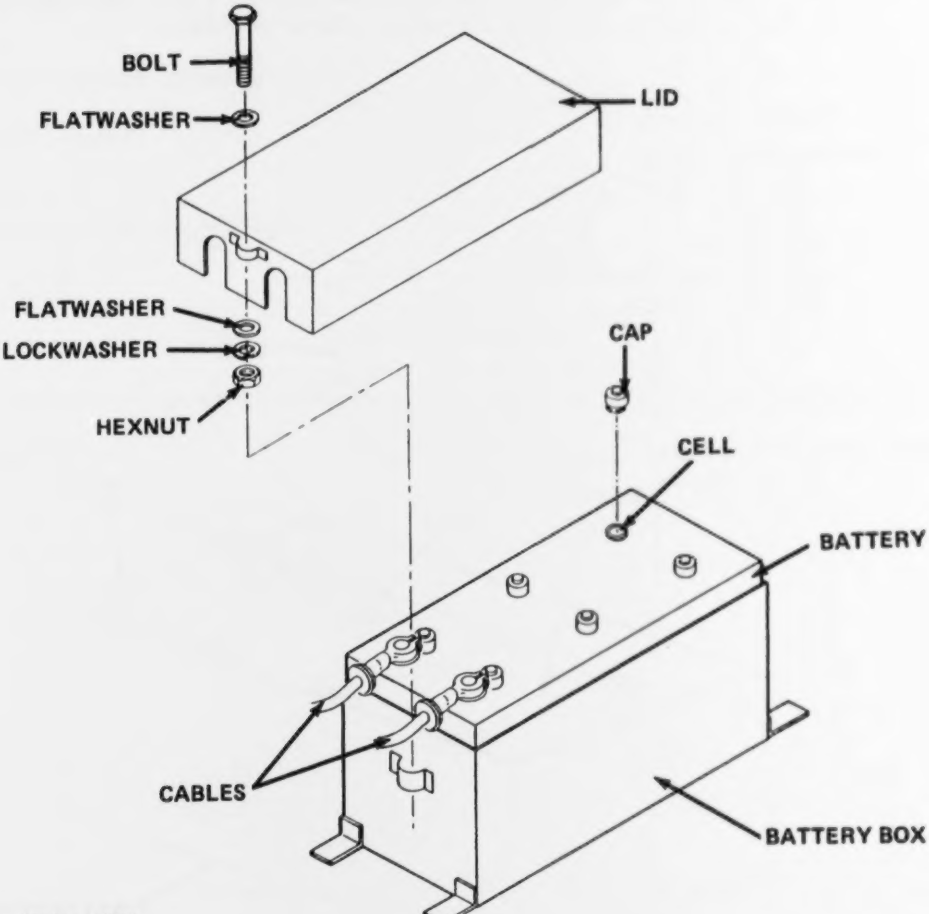
Used With

Trailer-mounted pump assemblies

Tools

Wirebrush, appendix C

Equipment Condition Para	Condition Description
2-13/ 2-14	Pumping stations shut down


BOLT
FLATWASHER
LID
FLATWASHER
LOCKWASHER
HEXNUT
CAP
CELL
BATTERY
CABLES
BATTERY BOX

a. Unit 609

1 Remove two hexnuts, two lockwashers, four flatwashers, and two bolts that attach lid to battery box. Remove lid.

3-5. BATTERY INSPECTION (CONT)

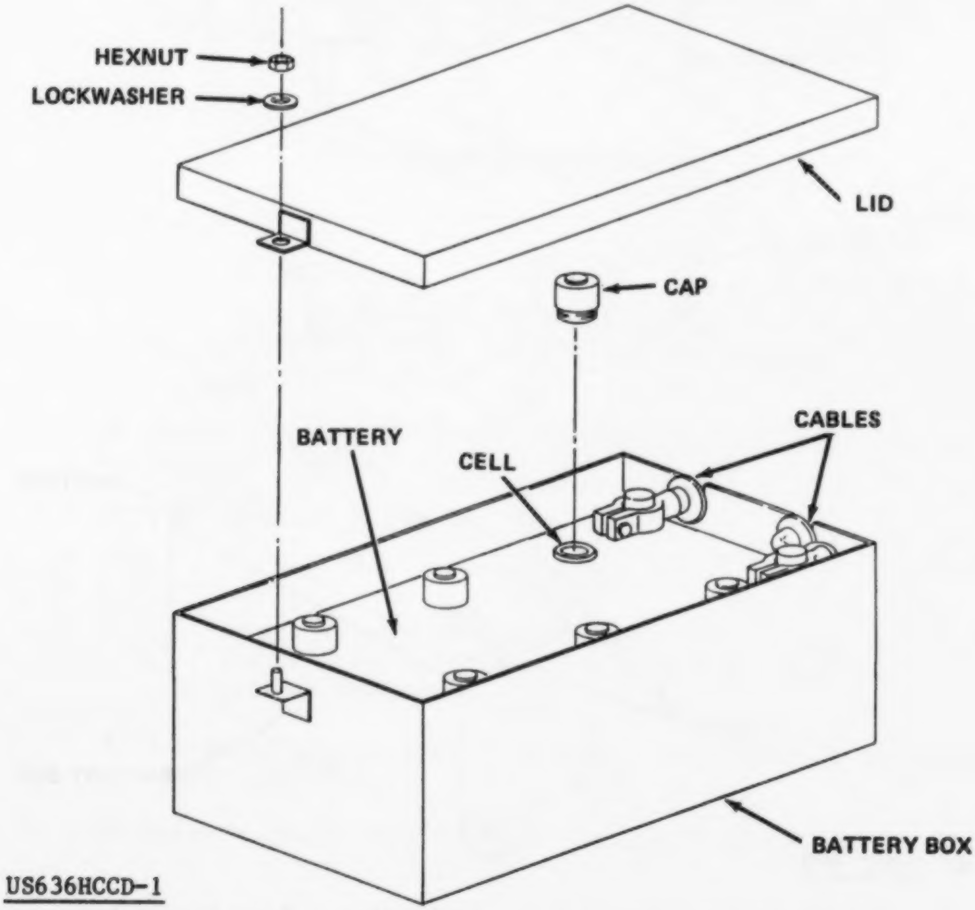
2 Check cables for loose connections and corrosion. Tighten loose connections. Using wirebrush, clean corrosion from cables as required.

WARNING

DANGER OF EXPLOSION: Fumes from battery acid may cause explosion. To prevent explosion, keep sparks and open flame away from battery acid.

3 Remove caps and check fluid level in six cells. If fluid is not visible in any cell, fill as necessary.

4 Install lid on box. Install two bolts, four flatwashers, two lockwashers, and two hexnuts. Hand-tighten.



b. US636HCCD-1

1 Remove two hexnuts and lockwashers that secure lid to battery box. Remove lid.

3-5. BATTERY INSPECTION (CONT)

2 Check cable ends for corrosion or loose connections. Tighten loose connections. Using wirebrush, clean corrosion from cables as required.

WARNING

DANGER OF EXPLOSION: Fumes from battery acid may cause explosion. To prevent explosion, keep sparks and open flame away from battery acid.

3 Remove caps and check fluid level in six cells. If fluid is not visible in any cell, fill as necessary.

4 Install lid on box. Install two lockwashers and two hexnuts. Hand-tighten.

3-6. AIR CLEANER SERVICE

This task covers:

a. Removal
b. Cleaning and Inspection
c. Installation

INTIAL SETUP

Used With

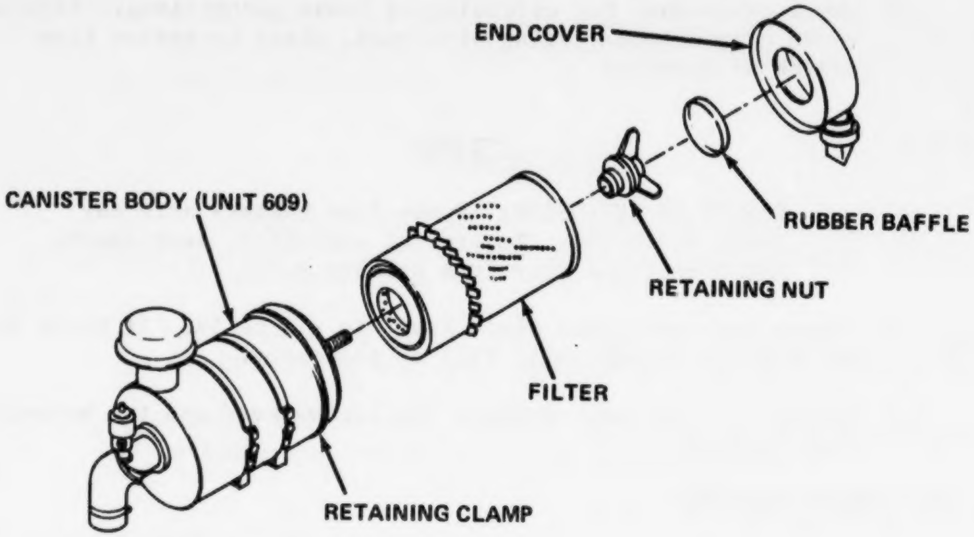
Trailer-mounted pump assemblies

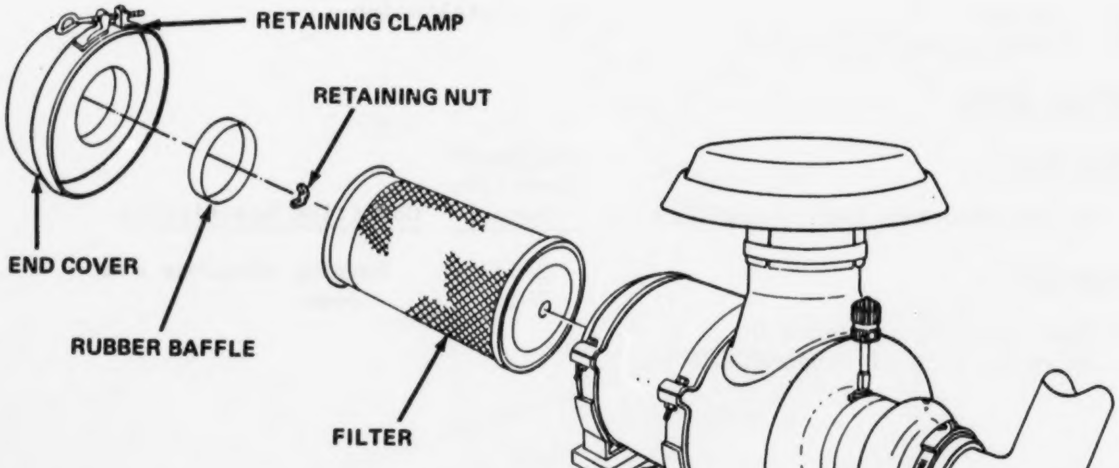
Supplies

Rags, item 9, appendix D
Solvent, item 11, appendix D

Equipment Condition Para	Condition Description
2-13/ 2-14	Pumping stations shut down.

3-6. AIR CLEANER SERVICE (CONT)


END COVER
RUBBER BAFFLE
CANISTER BODY (UNIT 609)
RETAINING NUT
FILTER
RETAINING CLAMP


RETAINING CLAMP
RETAINING NUT
END COVER
RUBBER BAFFLE
FILTER
CANISTER BODY (US636HCCD-1)

a. Removal

1 Loosen screw on end cover retaining clamp.

2 Remove end cover from canister body.

3 Remove filter retaining nut.

4 Remove filter from canister body.

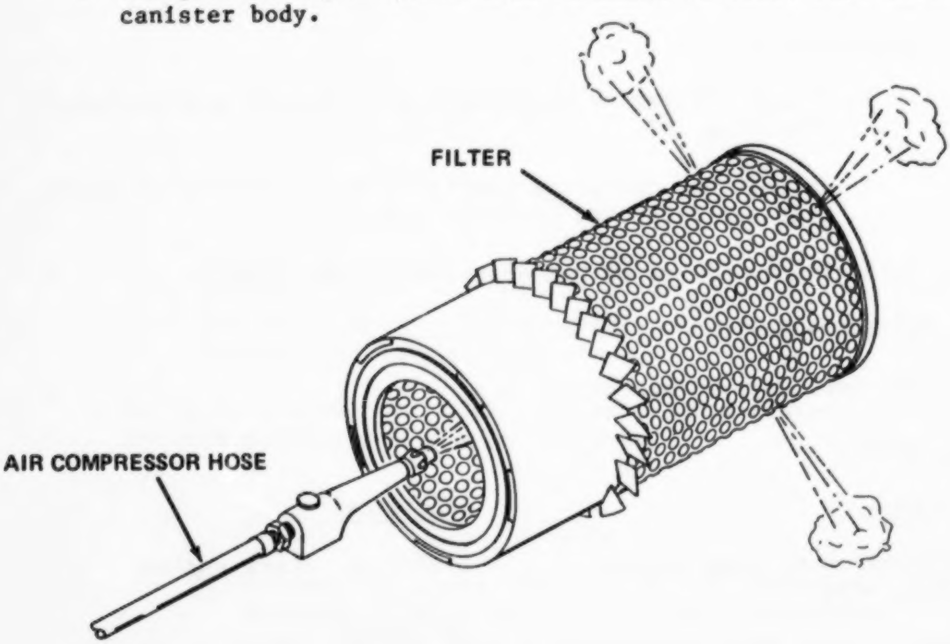
3-6. AIR CLEANER SERVICE (CONT)

b. Cleaning and Inspection

WARNING

- Solvent may cause toxic fumes. To prevent personal injury, work only in well-ventilated area. DO NOT breath fumes for a long time.
- Solvent is flammable. To prevent fire or explosion, DO NOT bring open flame or sparks near solvent.

1 Using clean rag dampened with cleaning solvent, wipe inside of canister body.



WARNING

Compressed air used for cleaning purposes will not exceed 30 psi. Use only with effective chip guarding and personal protective equipment (goggles/shield, gloves, etc.)

2 Using compressed air, clean filter. Blow dust from inside of filter outward. Clean outside of element with compressed air.

3 Look through large end of filter. If light cannot be seen through paper element, replace filter.

3-6. AIR CLEANER SERVICE (CONT)

WARNING

- Solvent may cause toxic fumes. To prevent personal injury, work only in well-ventilated area. DO NOT breath fumes for a long time.

- Solvent is flammable. To prevent fire or explosion, DO NOT bring open flame or sparks near solvent.

4 Remove rubber baffle from end cover. Empty dust from end cap. Using rag dampened in solvent, clean rubber baffle and install in end cover.

c. Installation

1 Install filter in canister body. Install and tighten filter retaining nut.

2 Install end cover over canister body. Center retaining clamp over end cover and canister body.

3 Tighten screw on end cover retaining clamp.

3-7. RADIATOR SERVICE

This task covers servicing only.

INTIAL SETUP

Used With

Trailer-mounted pump assembly (Unit 609)

Supplies

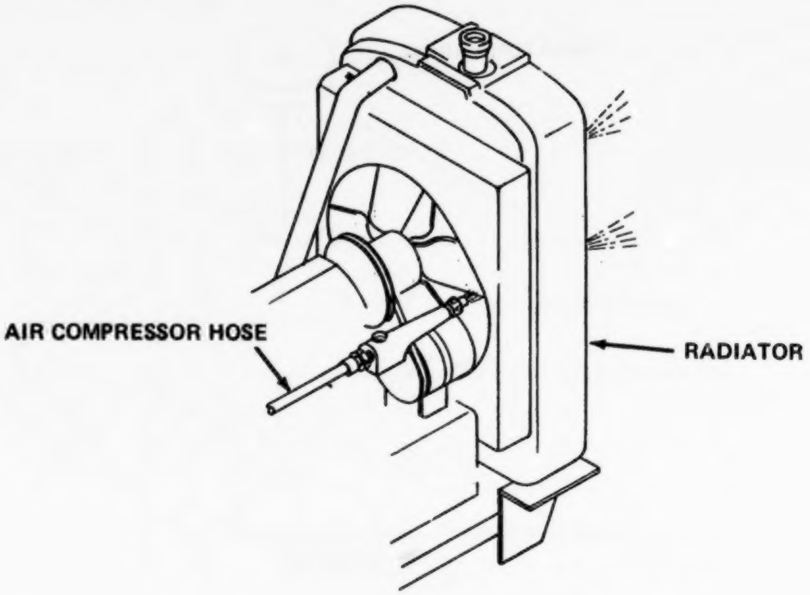
Rags, item 9, appendix D
Solvent, item 11, appendix D
Coolant, item 1, appendix D

References

2-13/2-14 Start engine

Equipment Condition Para	Condition Description
2-13/ 2-14	Pumping stations shut down.

3-7. RADIATOR SERVICE (CONT)



WARNING

Compressed air used for cleaning purposes will not exceed 30 psi. Use only with effective chip guarding and personal protective equipment (goggles/shield, gloves, etc.).

1 Using compressed air, clean radiator air passages. Blow dust and debris from engine side outward.

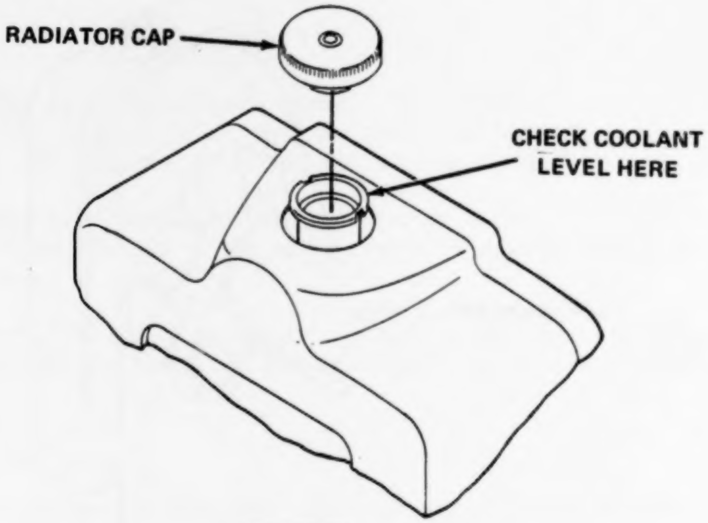
WARNING

- Solvent may cause toxic fumes. To prevent personal injury, work only in well-ventilated area. DO NOT breath fumes for a long time.

- Solvent is flammable. To prevent fire or explosion, DO NOT bring open flame or sparks near solvent.

2 Using cloth dampened in cleaning solvent, wipe dust and dirt from radiator exterior surfaces.

3-7. RADIATOR SERVICE (CONT)



WARNING

Allow radiator to cool before removing cap. Heated coolant is pressurized and could cause severe burns.

3 Slowly remove radiator cap.

NOTE

Proper coolant level is within 2 in. of radiator top.

4 Check coolant level. Add coolant as required.

5 Install radiator cap.

6 Start engine (para 2-13 or 2-14) and check for leaks.

3-8. PARK BRAKE CABLE ADJUSTMENT

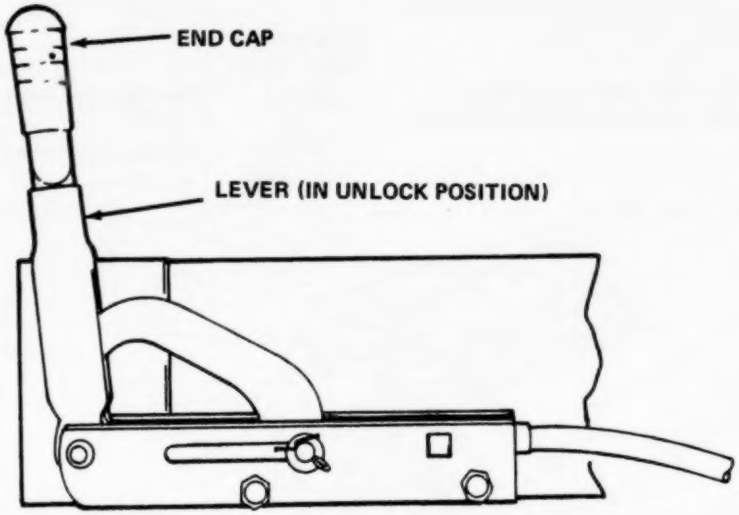
This task covers adjustment only.

INITIAL SETUP

Used With

Trailer-mounted pump assemblies

3-8. PARK BRAKE CABLE ADJUSTMENT (CONT)



1 Raise lever to unlock position.

2 Adjust cable tension. Turn end cap right to tighten cable. Turn end cap left to loosen cable.

CAUTION

> DO NOT overtighten cable. DO NOT force lever into lock position. If lever will not return to lock position without force, readjust cable tension.

3 Return lever to lock position.

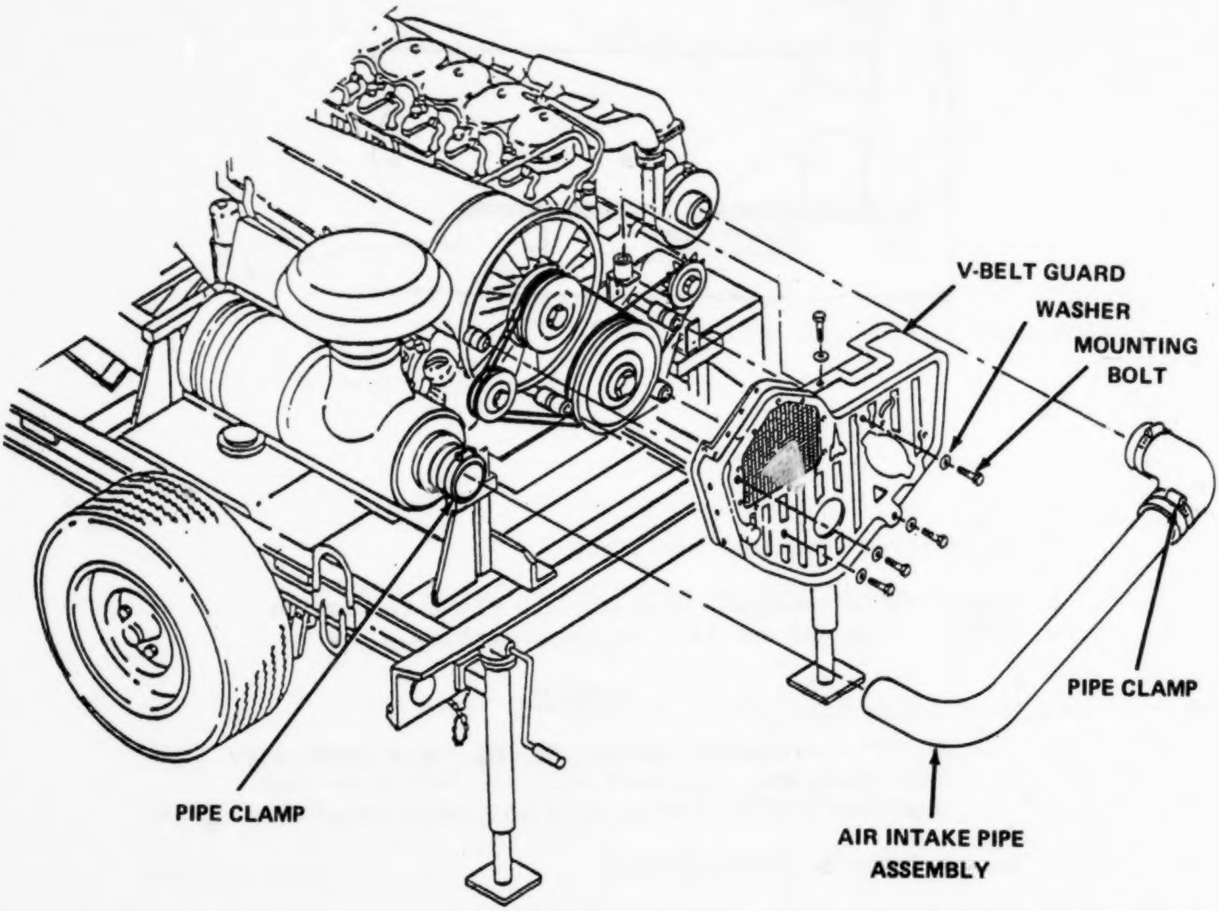
4 If cable cannot be adjusted, notify organizational maintenance.

3-9. V-BELT INSPECTION

This task covers inspection only.

INTIAL SETUP

Used With	Equipment Condition Para	Condition Description
Trailer-mounted pump assembly (US636HCCD-1)	2-13/ 2-14	Pumping stations shut down.

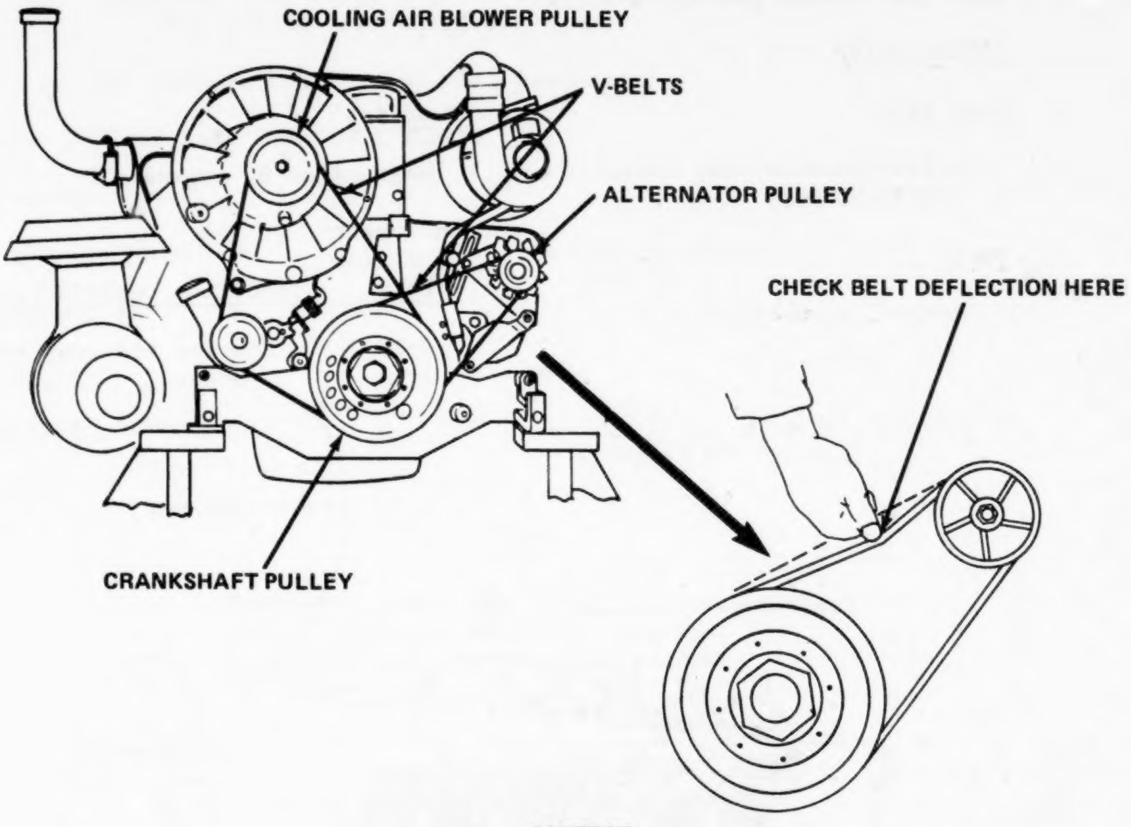

V-BELT GUARD
WASHER
MOUNTING BOLT
PIPE CLAMP
PIPE CLAMP
AIR INTAKE PIPE ASSEMBLY

1 Loosen air intake pipe clamps.

2 Remove air intake pipe assembly.

3 Remove five V-belt guard mounting bolts and washers. Remove guard.

3-9. V-BELT INSPECTION (CONT)


COOLING AIR BLOWER PULLEY
V-BELTS
ALTERNATOR PULLEY
CHECK BELT DEFLECTION HERE
CRANKSHAFT PULLEY

CAUTION

Do not operate pump assembly if V-belt is loose. A loose V-belt can cause improper operation, and could result in damage to equipment.

4 Using thumb, press down on V-belt, midway between alternator and crankshaft pulleys. If belt deflects more than 1/2 in., notify supervisor.

5 Using thumb, press down on each of two V-belts, midway between cooling air blower and crankshaft pulleys. If belt deflects more than 1/2 in., notify supervisor.

6 When belts are properly adjusted, install V-belt guard.

7 Install five mounting bolts and washers. Securely tighten bolts.

8 Install air intake pipe assembly. Securely tighten hose clamps.

3-10. COOLING AIR BLOWER SERVICE

This task covers servicing only.

INTIAL SETUP

Used With

Trailer-mounted pump assembly (US636HCCD-1)

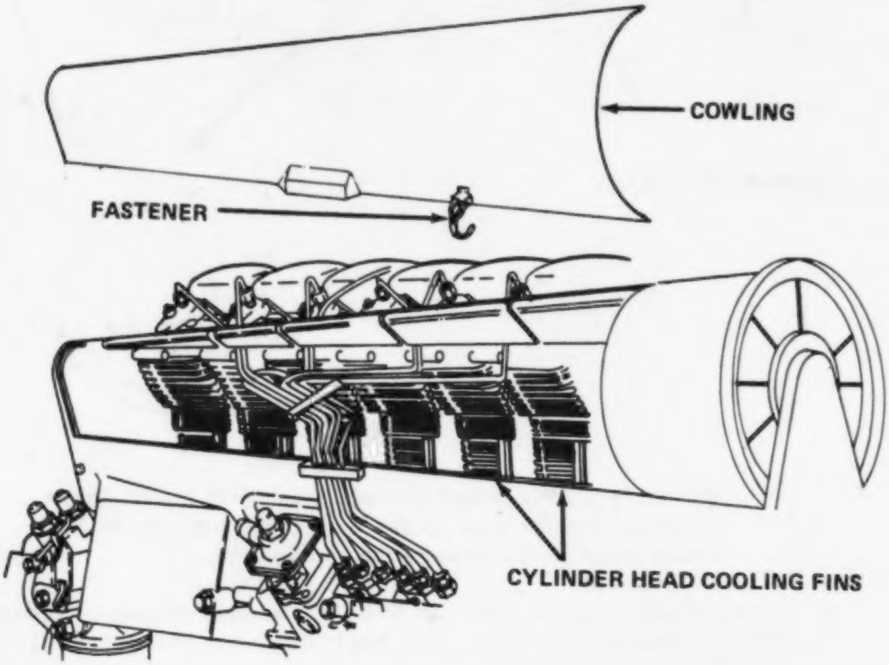
Tools

Scraper, appendix C

Supplies

Rags, item 9, appendix D

Equipment Condition Para	Condition Description
2-13 2-14	Pumping stations shut down.



1 Unsnap cowling fastners and remove cowling.

WARNING

Compressed air used for cleaning purposes will not exceed 30 psi. Use only with effective chip guarding and personal protective equipment (goggles/shield, gloves, etc.)

2 Using compressed air and a suitable scraper, carefully clean the cylinder head cooling fins.

3-10. COOLING AIR BLOWER SERVICE (CONT)

3 Using compressed air and clean rag, clean all dirt and dust from inside of cooling air blower.

4 Install cowling and snap fasteners.

3-11. STORAGE TANK EMERGENCY REPAIR

This task covers:

a. Wooden Plugs

b. Sealing Clamps

INTIAL SETUP

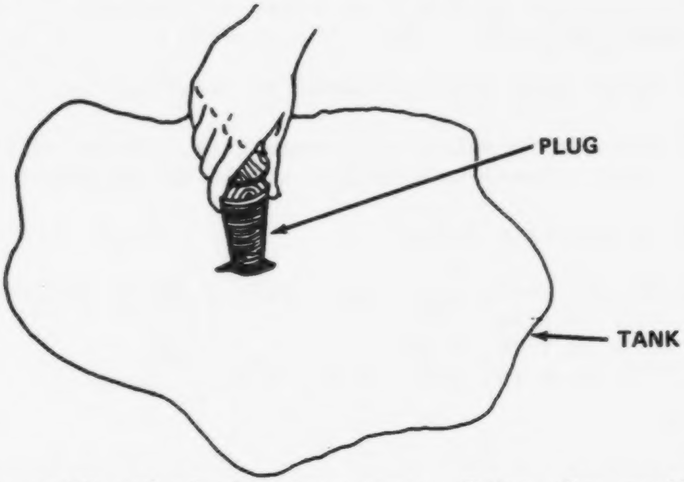
Used With	Tools
Storage tank	Repair items, item 27, section II, appendix B

NOTE

Emergency repair kit items are not intended for use as permanent repairs. Use only for temporary maintenance until permanent repairs can be made.

a. Wooden Plugs

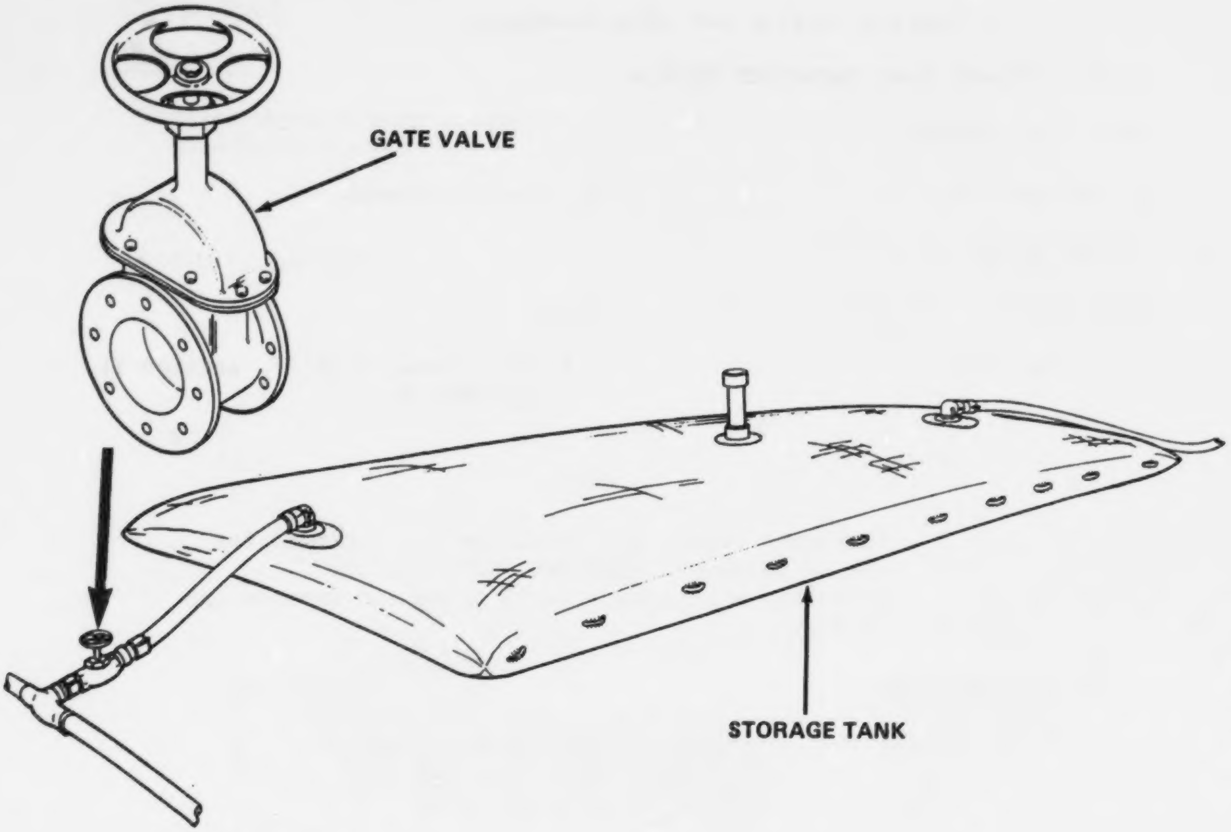
1 Select the proper size repair plug as follows:
1 to 2-1/2 in. tear - use 3 in. plug
3 to 4-1/2 in. tear - use 5 in. plug



2 Insert small end of plug into tear. Twist plug until the fit is snug and leakage is stopped or slowed to a trickle.

3-11. STORAGE TANK EMERGENCY REPAIR (CONT)

3 If leakage is not satisfactorily stopped, use a sealing clamp (task b below).



b. Sealing Clamps

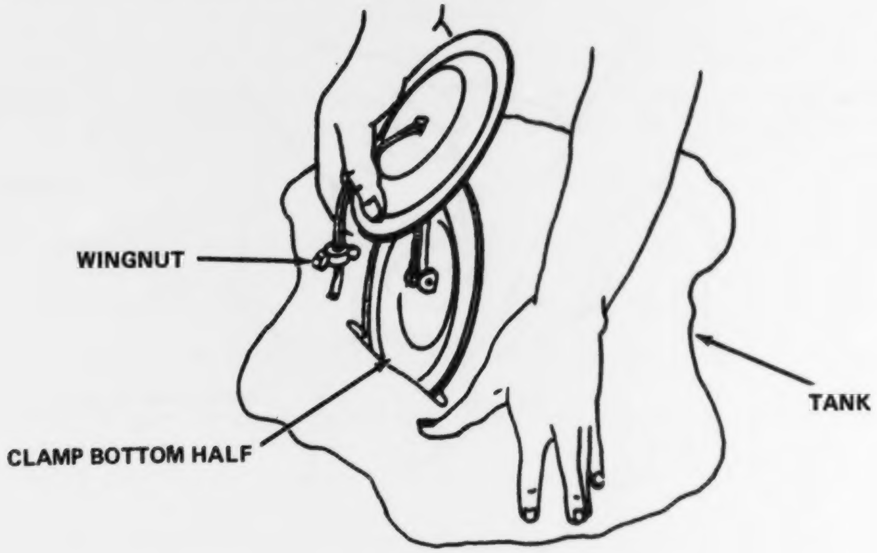
1 Close gate valve attached to reducing tee.

2 Open drain valve on storage tank. Drain water from storage tank. Ideal tank height should not exceed 2 ft for repairs.

3 Close drain valve.

4 Select the proper size repair clamp as follows:
  1 to 2 in. tear - use 3 in. clamp
  2 to 4 in. tear - use 5 in. clamp
  4 to 6 in. tear - use 7-1/2 in. clamp

3-11. STORAGE TANK EMERGENCY REPAIR (CONT)



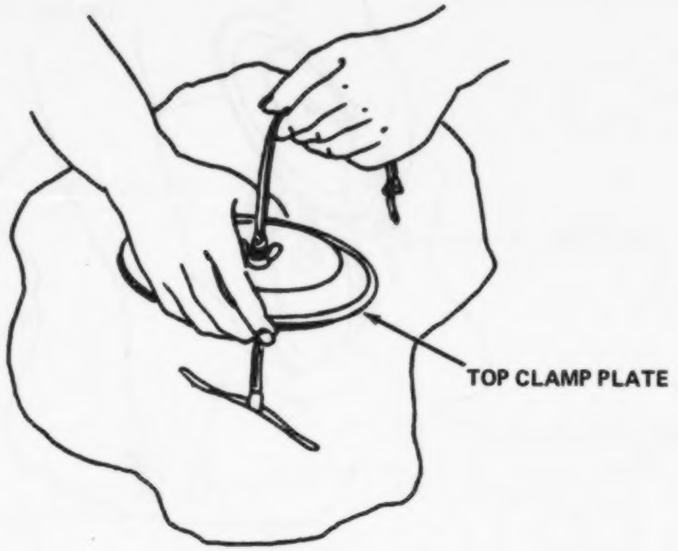
5 Unscrew wingnut on sealing clamp.

CAUTION

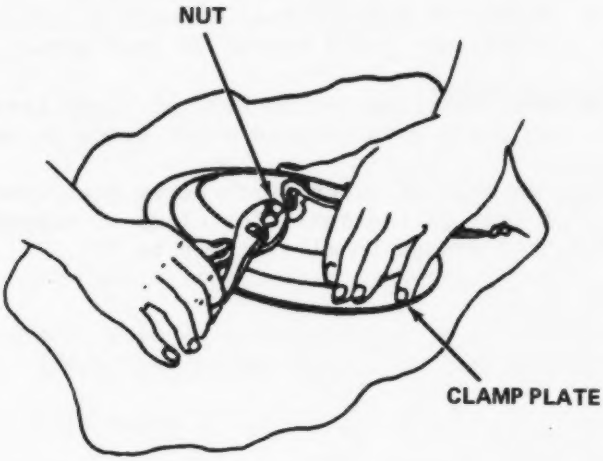
- Carefully enlarge tear in tank as tension in fabric may cause fabric to tear more.
- When slipping bottom half of clamp into tank, maintain grip on cord until clamp is secured.

6 Slip bottom half of clamp (with screw post) through tear in tank. If tear is too small for clamp to slip through, enlarge tear enough to allow clamp to fit.

3-11. STORAGE TANK EMERGENCY REPAIR (CONT)



7 Rotate both clamp plates so that the lengths run with the tear.



8 Fit top plate over screw post in bottom plate.

9 Install wingnut on screw post. Tighten nut until both plates are firmly secured.

10 Open gate valve at reducing tee and refill tank. Check repaired area for leakage.

APPENDIX A
REFERENCES

A-1. SCOPE. This appendix lists all forms, field manuals, technical manuals, and miscellaneous publications referenced in this manual.

A-2. FORMS

Equipment Inspection and Maintenance Worksheet	DA Form 2404
Quality Deficiency Report	SF 368
Recommended Changes to Publications and Blank Forms	DA Form 2028
Recommended Changes to Equipment Technical Publications	DA Form 2028-2

A-3. FIELD MANUALS

First Aid for Soldiers	FM 21-11

A-4. TECHNICAL MANUALS

Operator's and Organizational Maintenance Manual Including Repair Parts and Special Tools List for Pump, Centrifugal; Gasoline Engine Driven; Frame Mtd, 2-Inch, 125 GPM, 50 Foot Head (Military Design Model 2-125-50-G) (4320-00-542-3347)	TM 5-4320-208-12&P
Organizational, Direct Support, and General Support Maintenance Manual for the Tactical Water Distribution Equipment System (TWDS) Set 10-Mile Segment, Models 06749-0183-81 (4320-01-122-3547), 110-00-0000 (4320-01-168-0591), and 919 (4320-01-168-0590)	TM 5-4320-303-24
Organizational, Direct Support, and General Support Repair Parts and Special Tools List for the Tactical Water Distribution Equipment System (TWDS) Set 10-Mile Segment, Models 06749-0183-81 (4320-01-122-3547), 110-00-0000 (4320-01-168-0591), and 919 (4320-01-168-0590)	TM 5-4320-303-24P
Procedures for Destruction of Equipment to Prevent Enemy Use	TM 750-244-3

A-5. MISCELLANEOUS PUBLICATIONS

The Army Maintenance Management System (TAMMS)	DA Pam 738-750

APPENDIX B
COMPONENTS OF END ITEM AND BASIC ISSUE ITEMS LISTS

Section I. INTRODUCTION

B-1. SCOPE. This appendix lists components of end item and basic issue items for the Tactical Water Distribution Equipment System to help you inventory items required for safe and efficient operation.

B-2. GENERAL. The Components of End Item and Basic Issue Items Lists are divided into the following sections:

a. Section II. Components of End Item. This listing is for informational purposes only, and is not authority to requisition replacements. These items are part of the end item, but are removed and separately packaged for transportation or shipment. As part of the end item, these items must be with the end item whenever it is issued or transferred between property accounts. Illustrations are furnished to assist you in identifying the items.

b. Section III. Basic Issue Items. These are the minimum essential items required to place the Tactical Water Distribution Equipment System in operation, to operate it, and to perform emergency repairs. Although separately packaged, basic issue items (BII) must be with the Tactical Water Distribution Equipment System during operation and whenever it is transferred between property accounts. The illustrations will assist you in hard-to-identify items. This manual is your authority to request/requisition replacement BII, based on TOE/MTOE authorization of the end item.

B-3. EXPLANATION OF COLUMNS. The following provides an explanation of columns found in the tabular listings:

a. Column (1) - Illustration Number (Illus Number). This column indicates the number of the illustration in which the item is shown.

b. Column (2) - National Stock Number. Indicates the National stock number assigned to the item and will be used for requisitioning purposes.

c. Column (3) - Description. Indicates the Federal item name and, if required, a minimum description to identify and locate the item. The last line for each item indicates the FSCM (in parentheses) followed by the part number. If item needed differs for different models of this equipment, the model is shown under the "Usable On" heading in this column. These codes are identified as:

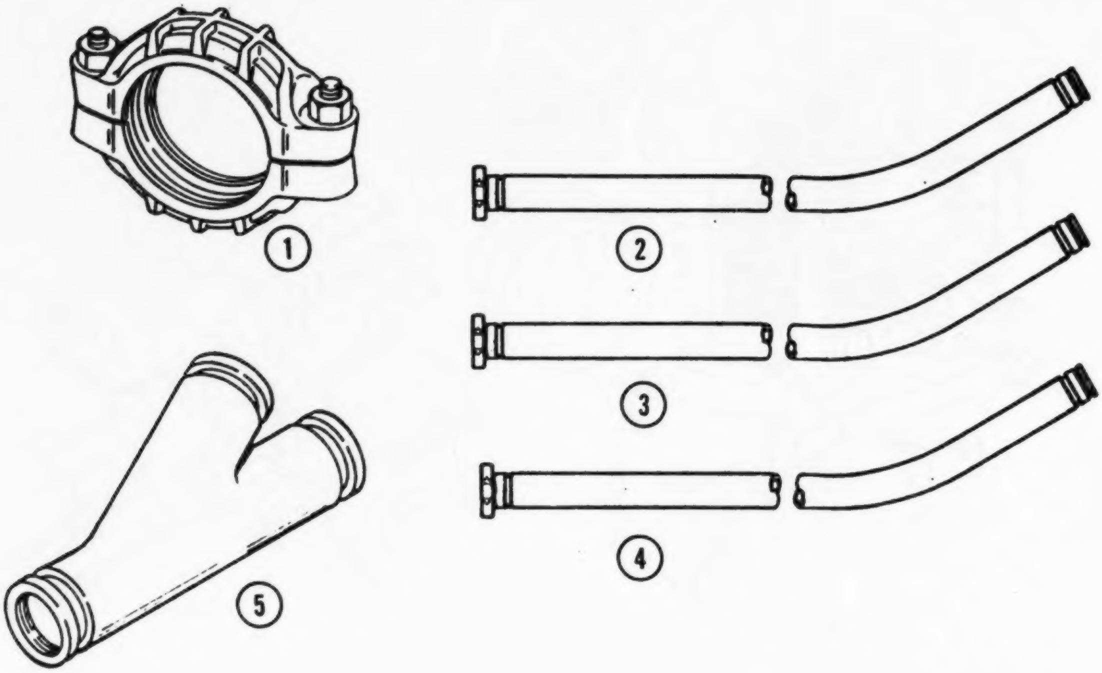
Code	Used On
DTC	Model 06749-0183-81
DTQ	Model 110-00-0000
DTR	Model 919

B-3. EXPLANATION OF COLUMNS. (CONT)

d. Column (4) - Unit of Measure (U/M). Indicates the measure used in performing the actual operational/maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in., pr).

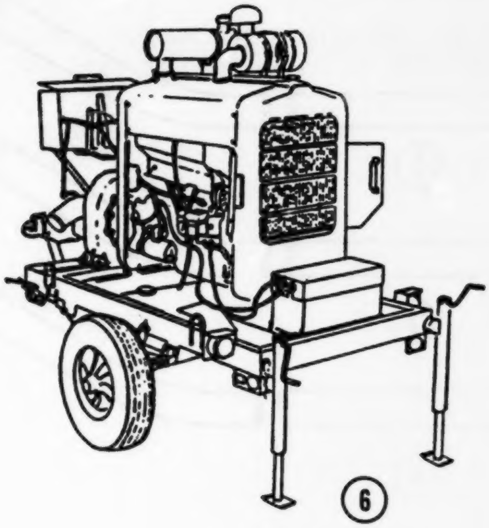
e. Column (5) - Quantity required (Qty Rqr). Indicates the quantity of the item authorized to be used with/on the equipment.

Section II. COMPONENTS OF END ITEM



(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	Usable On Code	(4) U/M	(5) Qty Rqr
		PUMPING STATIONS			
1		COUPLING, GROOVED PIPE, 6 IN. (81349) M10387-1-D-11		EA	48
2		HOSE ASSEMBLY, DISCHARGE, 6 IN. X 10 FT (81349) MIL-H-53027		EA	6
3		HOSE ASSEMBLY, DISCHARGE, 6 IN. X 20 FT (81349) MIL-H-53027		EA	6
4		HOSE ASSEMBLY, DISCHARGE, 6 IN. X 75 FT (81349) MIL-H-53027		EA	6
5		PIPE FITTING, LATERAL GROOVED, 45°, 6 IN.		EA	12

Section II. COMPONENTS OF END ITEM (CONT)



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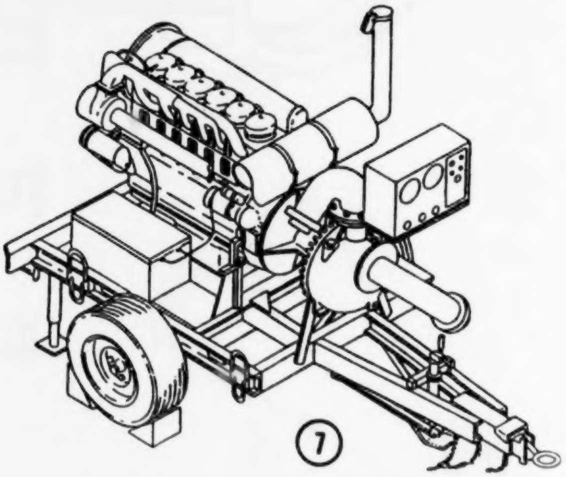
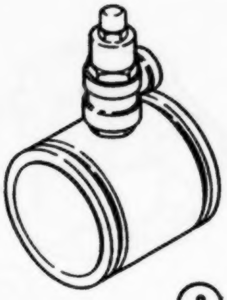


⑦

(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	(3) Usable On Code	(4) U/M	(5) Qty Rqr
6		PUMPING ASSY, TRAILER MTD, 600 GPM, UNIT 609 (97403) 13225E9088-3	DTC, DTQ	EA	6
7		PUMPING ASSY, TRAILER MTD, 600 GPM, US636HCCD-1 (97403) PD80366	DTR	EA	6

Section II. COMPONENTS OF END ITEM (CONT)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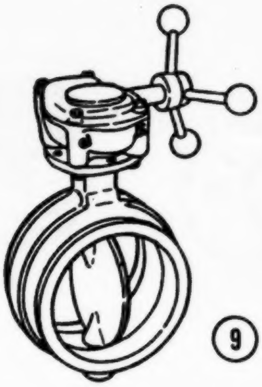
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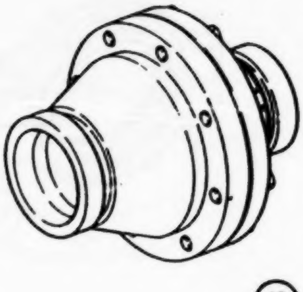
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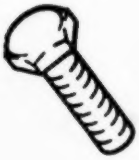
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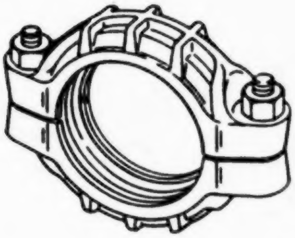
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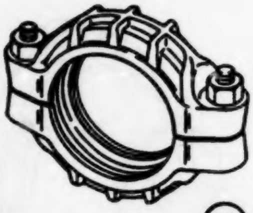
(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	Usable On Code	(4) U/M	(5) Qty Rqr
8		VALVE ASSEMBLY, PRESSURE RELIEF, 6 IN. (97403) 13225E9196		EA	6
9		VALVE, BUTTERFLY, 6 IN., GEAR-ACTUATED (79154) 700E6IN		EA	18
10		VALVE, CHECK, EPDM, 6 IN. (79154) 710E6IN		EA	6
		STORAGE ASSEMBLIES			
11	5305-00-724-5935	BOLT, UNC-2A X 3.25 IN. (96906) MS90725-169		EA	32
12		COUPLING, GROOVED PIPE, 4 IN. (81349) M10387-1-D-09		EA	2

Section II. COMPONENTS OF END ITEM (CONT)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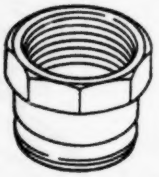
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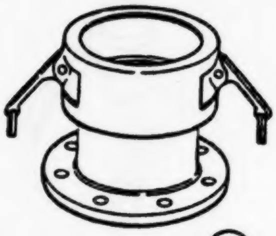
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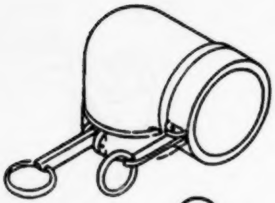
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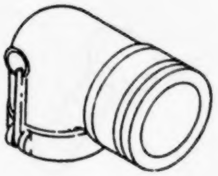
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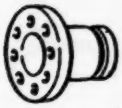
(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	Usable On Code	(4) U/M	(5) Qty Rqr
13		COUPLING, GROOVED PIPE, 6 IN. (81349) M10387-1-D-11		EA	2
14	4730-00-088-9286	COUPLING HALF, QUICK-DISCONNECT FLANGED, FEMALE, 4 IN. (96906) MS27024-17		EA	2
15	4730-00-840-0796	COUPLING HALF, QUICK-DISCONNECT MALE, 4 IN. (96906) MS272020-17		EA	2
16		ELBOW, 4 IN. X 90°, FEMALE-TO-FEMALE (81718) OPW-633KB		EA	2
17		ELBOW, 4 IN. X 90°, FEMALE-TO-MALE (81718) OPW-633K		EA	2

Section II. COMPONENTS OF END ITEM (CONT)



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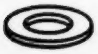

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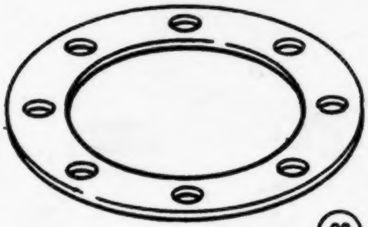

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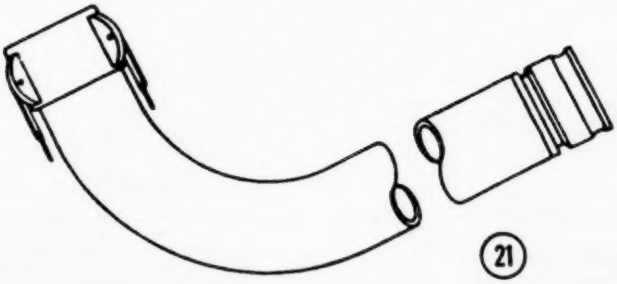

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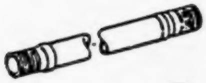
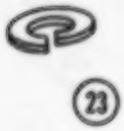
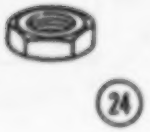


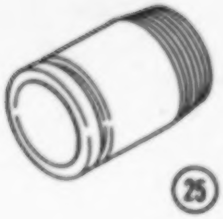
22

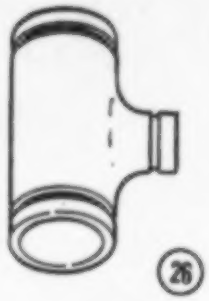
(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	(3) Usable On Code	(4) U/M	(5) Qty Rqr
18		FLANGE ADAPTER, 4 IN. (96906) MS27023-17		EA	2
19	5310-00-823-8803	FLATWASHER, 0.046 ID X 0.812 OD (96906) MS27183-21		EA	64
20		GASKET, CLASS 150, 4 IN. NOM (97403) 13220E1069		EA	4
21		HOSE ASSY, DISCH, 4 IN. X 10 FT (97403) 13225E9136-3		EA	8
22		HOSE, SUCTION, 3/4 IN. (56221) 3/4X8-0-LG		EA	2

Section II. COMPONENTS OF END ITEM (CONT)



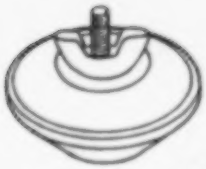






(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	(3) Usable On Code	(4) U/M	(5) Qty Rqr
23	5310-00-820-6653	LOCKWASHER, 0.375 IN (96906) MS35338-50		EA	32
24	5310-00-004-5038	NUT, PLAIN, 0.375 16 UNC-2B (96906) MS51967-20		EA	32
25		PIPE FITTING, COUPLING, 4 IN. (81349) M10388-A-07-AI-1-A-6A		EA	2
26		REDUCING TEE, GROOVED PIPE, 6 X 6 X 4 IN. (81349) M10388-A-30-EB-1-A-6C		EA	2

Section II. COMPONENTS OF END ITEM (CONT)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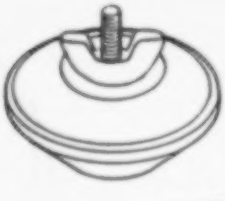
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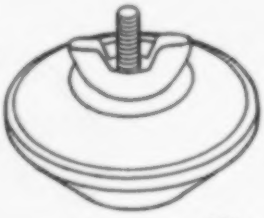
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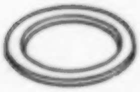
27 — 28 Thru 37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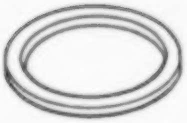
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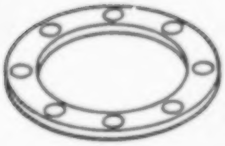
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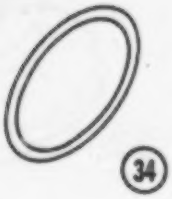
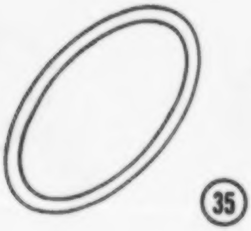
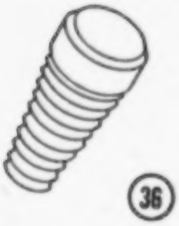
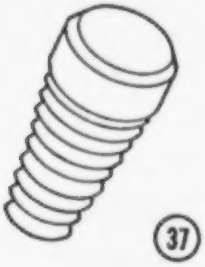
(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	(3) Usable On Code	(4) U/M	(5) Qty Rqr
27		REPAIR ITEMS, POTW, 20,000 GAL TANK (56221) 480-4-44987-101		EA	2
28		CLAMP, 3 IN.		EA	8
29		CLAMP, 5 IN.		EA	4
30		CLAMP, 7-1/2 IN.		EA	4
31		GASKET, COUPLING, 2 IN.		EA	4
32		GASKET, COUPLING, 4 IN.		EA	4
33		GASKET, FLANGE, 4 IN.		EA	4

Section II. COMPONENTS OF END ITEM (CONT)





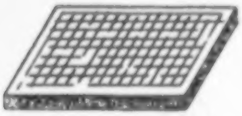




(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	Usable On Code	(4) U/M	(5) Qty Rqr
34		O-RING		EA	4
35		O-RING		EA	4
36		PLUG, TAPERED, 3 IN.		EA	4
37		PLUG, TAPERED, 5 IN.		EA	4

Section II. COMPONENTS OF END ITEM (CONT)

(39)



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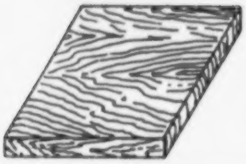
38 – 39 Thru 53



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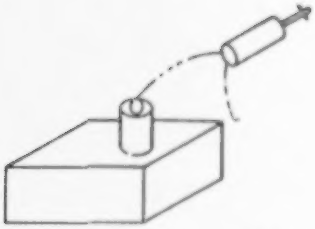

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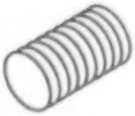
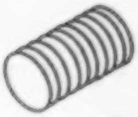


(43)

(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	Usable On Code	(4) U/M	(5) Qty Rqr
38		REPAIR KIT, 20,000 GAL TANK (56221) 480-4-44992-101		EA	2
39		ADHESIVE, 12 IN. X 18 IN.		EA	4
40		AIRFOAM, CLOTH BACKED, 1/2 IN.		EA	2
41		BOARD, 8 IN. X 8 IN., 1 IN. THICK		EA	2
42		CURE IRON		EA	2
43		DISC, ADHESIVE, 4 IN.		EA	20

Section II. COMPONENTS OF END ITEM (CONT)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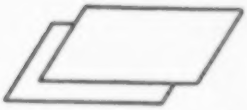
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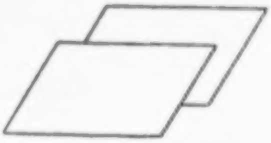
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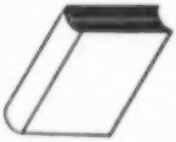
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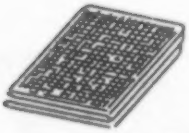
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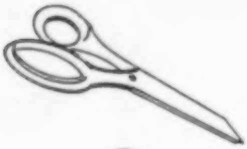
(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	Usable On Code	(4) U/M	(5) Qty Rqr
44		DISC, FABRIC COATED, 4 IN.		EA	20
45		FABRIC, COATED, 12 IN. X 18 IN.		EA	4
46		FILM, TEFLON, 8 IN. X 8 IN.		EA	4
47		INSTRUCTIONS		EA	2
48		PLATE, ALUMINUM, 6 IN. X 6 IN.		EA	1
49		RAGS		EA	8

Section II. COMPONENTS OF END ITEM (CONT)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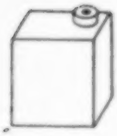
(51)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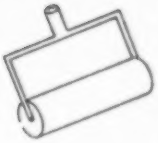
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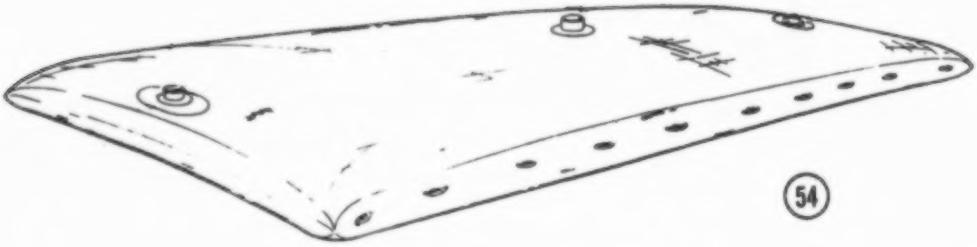
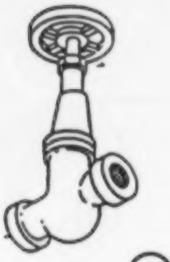

(54)

(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	(3) Usable On Code	(4) U/M	(5) Qty Rqr
50		SCISSORS, 6 IN.		EA	2
51		SHEET, GUM 12 IN. X 18 IN.		EA	2
52		SOLVENT, MEK		GL	2
53		STITCHER, 1-1/2 IN. DIA X 1-1/2 IN. WIDE		EA	2
54	5430-01-106-9678	TANK, STORAGE, 20,000 GAL (97403) 80303		EA	2

Section II. COMPONENTS OF END ITEM (CONT)



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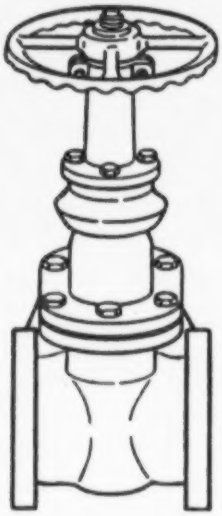

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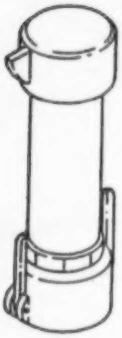

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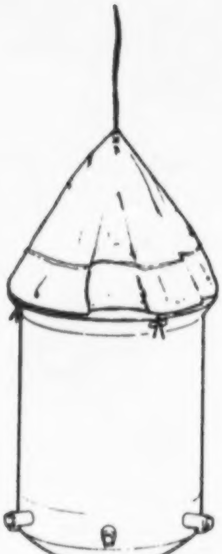
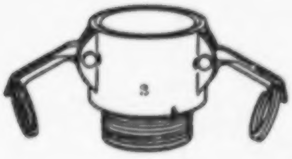


58

(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	Usable On Code	(4) U/M	(5) Qty Rqr
55		VALVE, GATE, 1/2 IN. (12168) T-111-1/2		EA	2
56		VALVE, GATE, 4 IN., FLANGED (97403) 13220E1071		EA	2
57		VENT ASSEMBLY, QUICK-DISCONNECT (56221) 480-4-44917-101		EA	2
		DISTRIBUTION POINTS			
58	4610-00-268-9890	BAG, DRINKING WATER STORAGE, 36 GAL (97403) 13200E6480		EA	4

Section II. COMPONENTS OF END ITEM (CONT)



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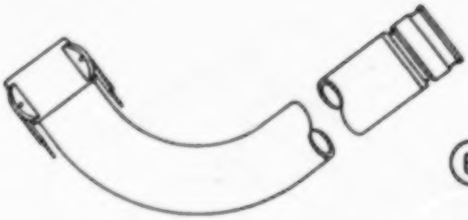

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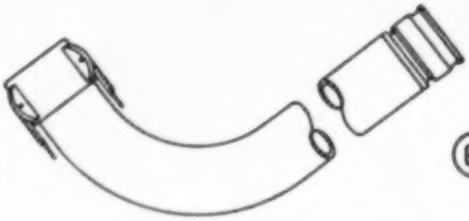

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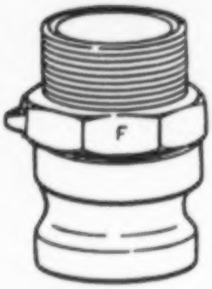

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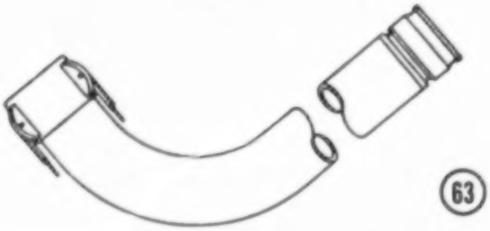
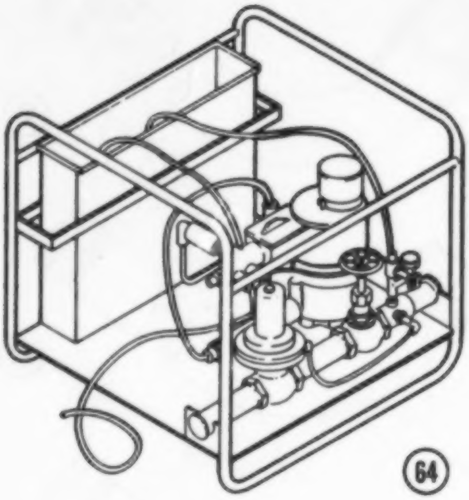


(63)

(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	Usable On Code	(4) U/M	(5) Qty Rqr
59	4730-00-088-9285	COUPLING HALF, 200-B (96906) MS27026-11		EA	8
60	4730-00-938-7997	COUPLING HALF, 200-F (96906) MS27022-11		EA	8
61		HOSE ASSEMBLY, DISCHARGE, 2 IN. X 10 FT (97403) 13225E9136-1		EA	2
62		HOSE ASSEMBLY, DISCHARGE, 2 IN. X 20 FT (97403) 13225E9136-2		EA	14
63		HOSE ASSEMBLY, SUCTION, 2 IN. X 20 FT (97403) 13225E9135-2		EA	2

Section II. COMPONENTS OF END ITEM (CONT)



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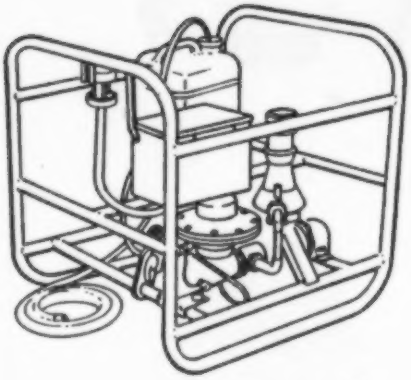
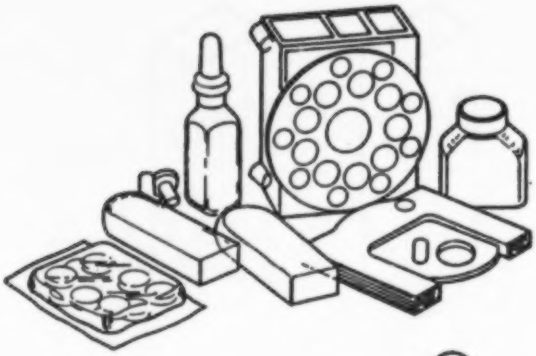


(65)

(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	(3) Usable On Code	(4) U/M	(5) Qty Rqr
64	4610-00-937-6862	HYPOCHLORINATION UNIT 1955-1 (09680) MIL-H-12732	DTC, DTR	EA	2
65	4610-00-880-0514	HYPOCHLORINATION UNIT A-506131 (79172) A506131	DTQ	EA	2

Section II. COMPONENTS OF END ITEM (CONT)



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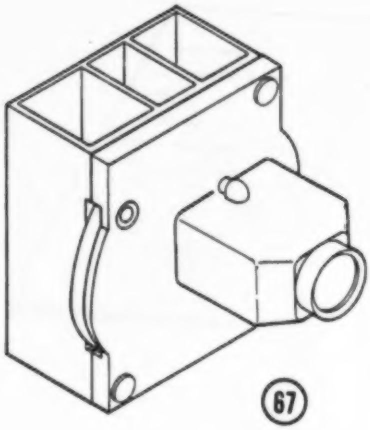

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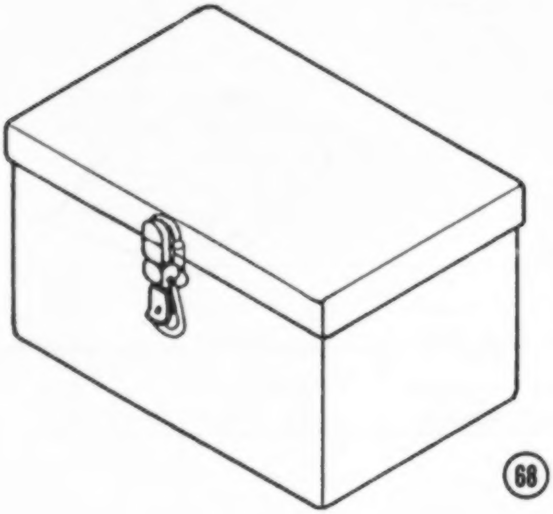

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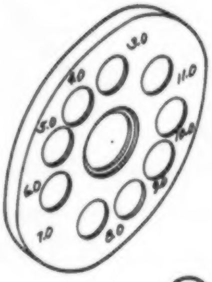
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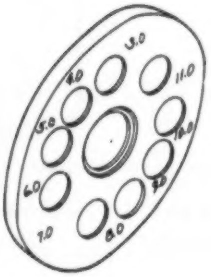
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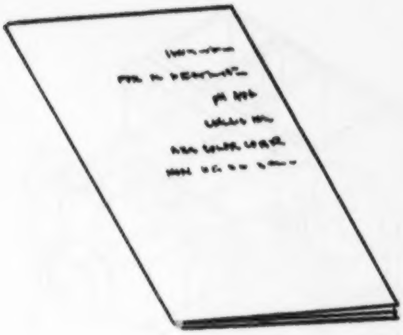
(70)

(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	(3) Usable On Code	(4) U/M	(5) Qty Rqr
66	6630-01-044-0334	KIT, COLOR COMPARATOR (12308) U25337		EA	2
67		COLOR COMPARATOR		EA	1
68		CONTAINER, KIT		EA	1
69		DISC, CHLORINE		EA	1
70		DISC, PH		EA	1

Section II. COMPONENTS OF END ITEM (CONT)



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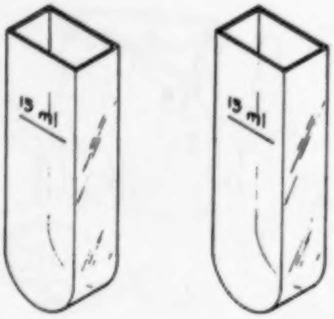

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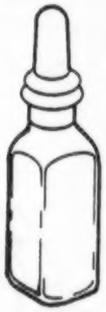

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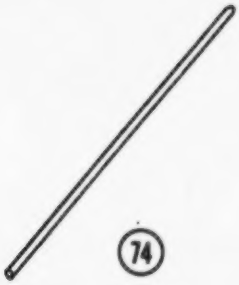

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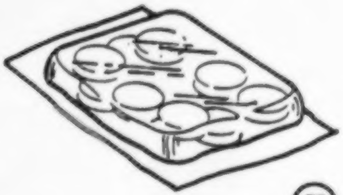

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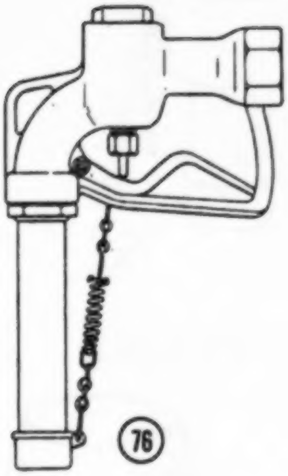
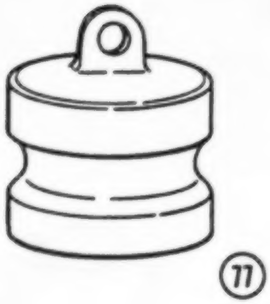
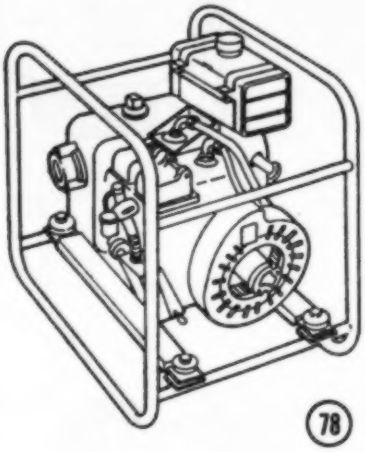
(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	Usable On Code	(4) U/M	(5) Qty Rqr
71		INSTRUCTIONS		EA	1
72		SAMPLE CELLS		EA	4
73		SOLUTION, PH, 4 OZ		OZ	1
74		STIRRING ROD		EA	1
75		TABLETS, DPD		BX	1

Section II. COMPONENTS OF END ITEM (CONT)

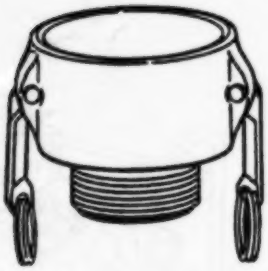






(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	Usable On Code	(4) U/M	(5) Qty Rqr
76		NOZZLE, 1-1/4 IN. (97403) 13225E9096		EA	4
77	4730-00-915-5127	PLUG, DUST, QUICK-DISCONNECT, 200 DP (96906) MS27029-11		EA	4
78	4320-00-542-3347	PUMP, 125 GPM (97403) MIL-P-52109		EA	2

Section II. COMPONENTS OF END ITEM (CONT)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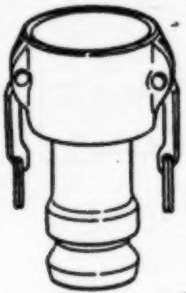
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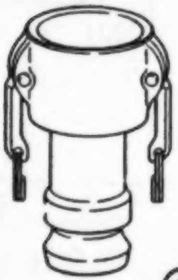
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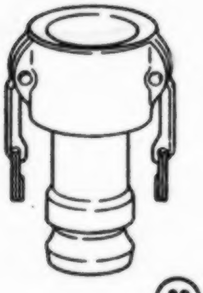
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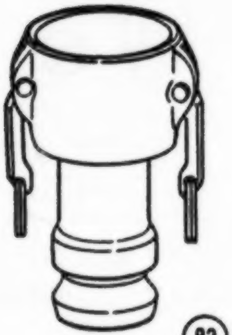
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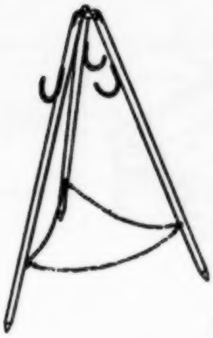
(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	Usable On Code	(4) U/M	(5) Qty Rqr
79	4730-01-192-1624	REDUCER, 2015-B (96906) MS49002-9		EA	4
80	4730-00-951-3295	REDUCER, 2015-DA (96906) MS49000-5		EA	4
81	4730-00-951-3297	REDUCER, 2030-DA-AL (96906) MS49000-11		EA	2
82	4730-01-186-0821	REDUCER, 2040-DA-AL (96906) MS49000-19		EA	2
83	4730-01-064-0560	REDUCER, 4020-DA (97403) MS49000-17		EA	2

Section II. COMPONENTS OF END ITEM (CONT)



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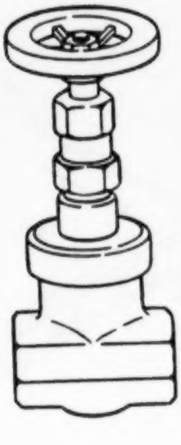

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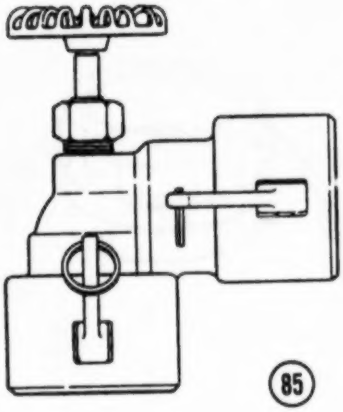

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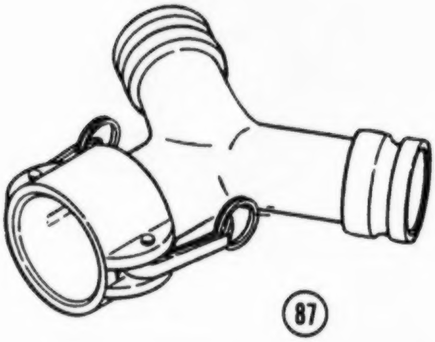

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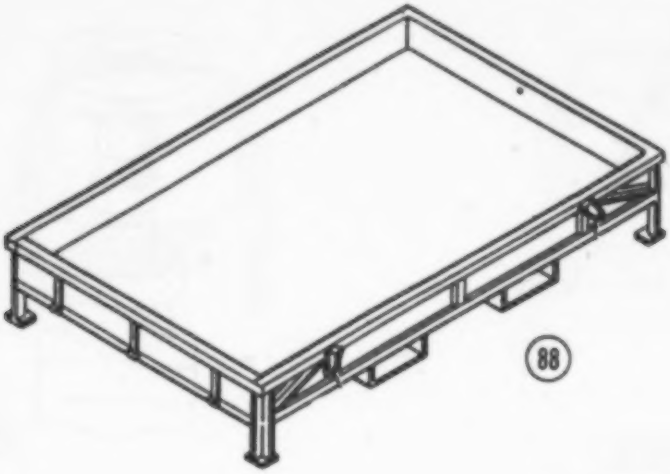
(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	(3) Usable On Code	(4) U/M	(5) Qty Rqr
84		STAND ASSY, NOZZLE (97403) 13225E9140		EA	4
85		VALVE, ELBOW COUPLER, 2 IN. X 2 IN. (97403) 13219E0491		EA	4
86	4820-00-810-4250	VALVE, GATE, 2 IN. (82666) B120-2"		EA	4
87		Y-CONNECTION, QUICK-DISCONNECT, 2 X 2 x 2 IN. (81718) 319K		EA	6

Section II. COMPONENTS OF END ITEM (CONT)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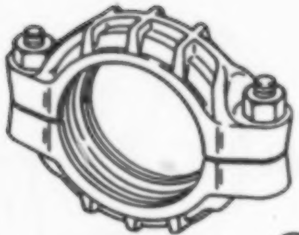
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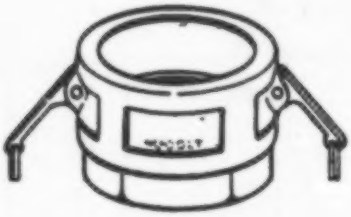
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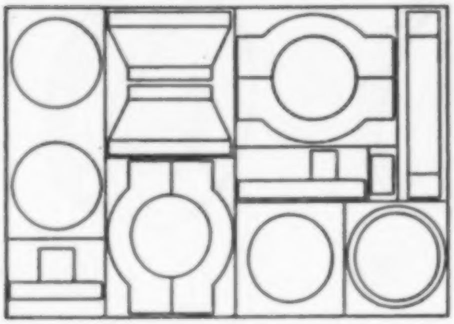
(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	Usable On Code	(4) U/M	(5) Qty Rqr
		10-MILE HOSELINE SEGMENT			
88		BOX, FLAKING (97403) 13225E9182		EA	132
89		COUPLING, GROOVED PIPE, 6 IN. (81349) M10387-1-D-11		EA	15
90	4730-00-915-5127	COUPLING HALF, QUICK-DISCONNECT, FEMALE, 6 IN. (96906) MS27024-19		EA	1

Section II. COMPONENTS OF END ITEM (CONT)



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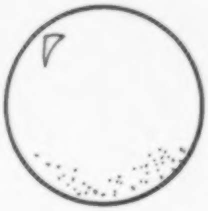

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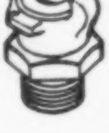

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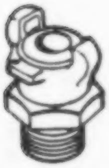

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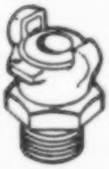

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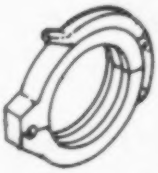

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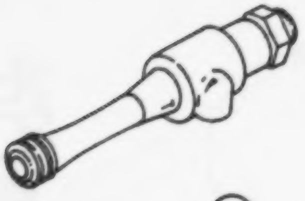
(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	Usable On Code	(4) U/M	(5) Qty Rqr
91		DISPLACEMENT AND EVACUATION KIT (97403) 13226E1577		EA	2
92		BALL, POLYURETHANE, 6IN.		EA	4
93		COUPLER, PNEUMATIC, UF-75-B		EA	4
94		COUPLER, PNEUMATIC, UF-100-B		EA	2
95		COUPLER, PNEUMATIC, UM-100-B		EA	2
96		COUPLING, SNAPLOCK, GROOVED PIPE, 6 IN.		EA	2

Section II. COMPONENTS OF END ITEM (CONT)



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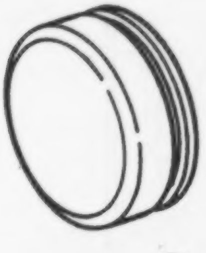

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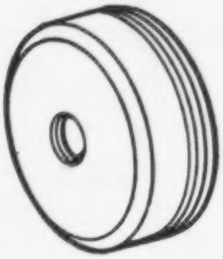

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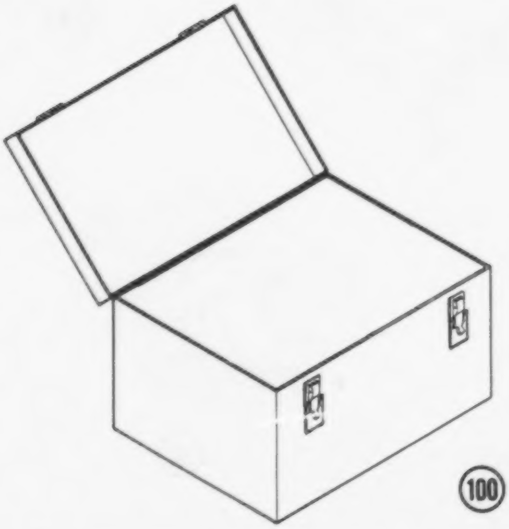

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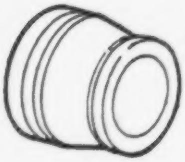

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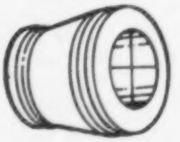
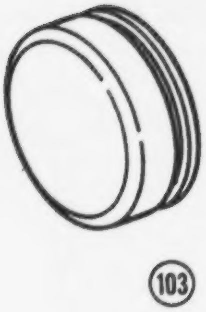
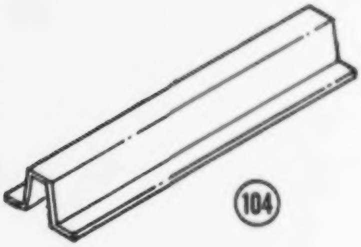


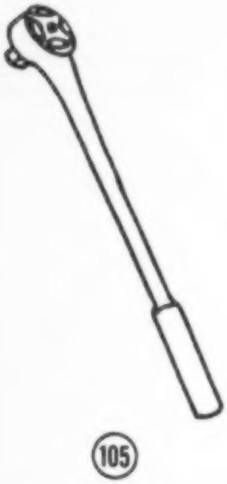
102

(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	(3) Usable On Code	(4) U/M	(5) Qty Rqr
97		EJECTOR ASSEMBLY, BRONZE		EA	2
98		END CAP, GROOVED PIPE 6 IN.		EA	48
99		END CAP, GROOVED PIPE, 6 IN. DRILLED AND TAPPED		EA	2
100		KIT CHEST, METAL		EA	2
101		REDUCER, GROOVED PIPE, 8 IN. X 6 IN.		EA	2
102		REDUCER, GROOVED PIPE, 8 IN. X 6 IN. MODIFIED AS BALL RECEIVER		EA	2

Section II. COMPONENTS OF END ITEM (CONT)

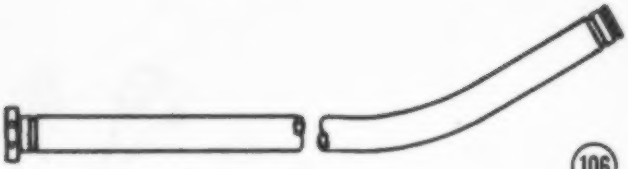






(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	Usable On Code	(4) U/M	(5) Qty Rqr
103	4730-01-178-0317	END CAP, GROOVED PIPE, 6 IN. (81349) M10388-A-05-AK-1-A		EA	1
104		GUARD, ROAD CROSSING, 6 IN. HOSELINE (97403) 13226E1576		EA	24
105		HANDLE, SOCKET WRENCH (97403) 13225E9090-28		EA	4

Section II. COMPONENTS OF END ITEM (CONT)



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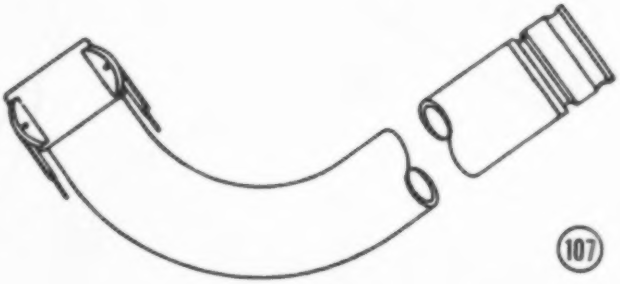
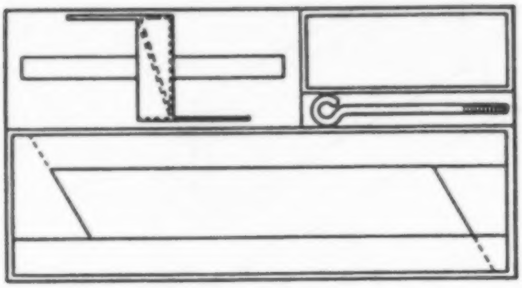


(107)

(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	Usable On Code	(4) U/M	(5) Qty Rqr
106		HOSE ASSEMBLY, COLLAPSIBLE, 6 IN. X 500 FT (81349) MIL-H-53027		EA	132
107		HOSE ASSEMBLY, SUCTION, 6 IN. X 10 FT (97403) 13225E9135-6		EA	12
108		NAIL, STEEL ROOFING, 1-1/2 IN.		EA	240

Section II. COMPONENTS OF END ITEM (CONT)



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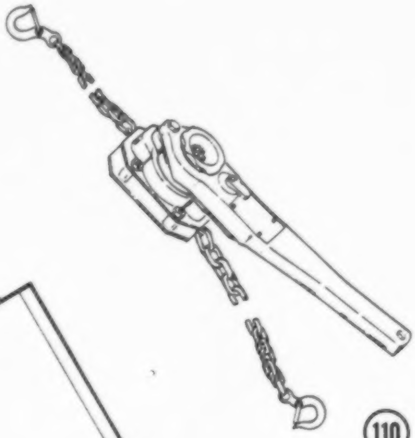

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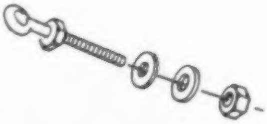

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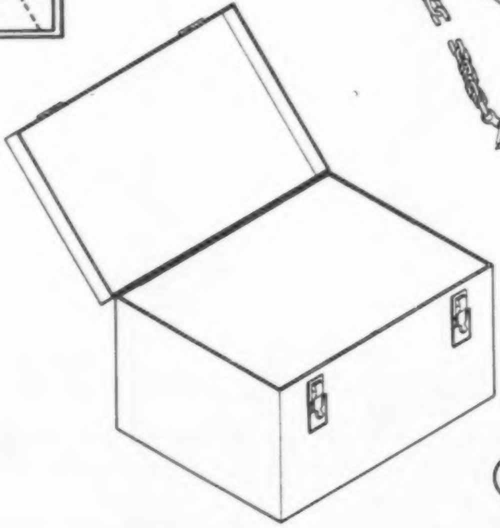

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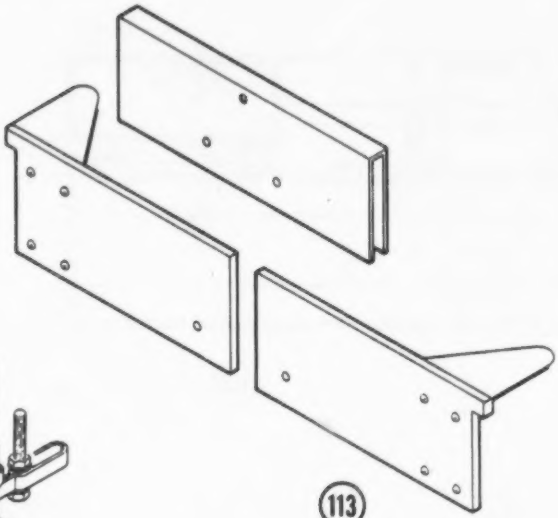
(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	(3) Usable On Code	(4) U/M	(5) Qty Rqr
109		PACKING KIT, HOSELINE, 6 IN. (81349) MIL-P-52348-6		EA	1
110		CHAIN HOIST		EA	1
111		EYEBOLT ASSEMBLY		EA	2
112		KIT CHEST, METAL		EA	1

Section II. COMPONENTS OF END ITEM (CONT)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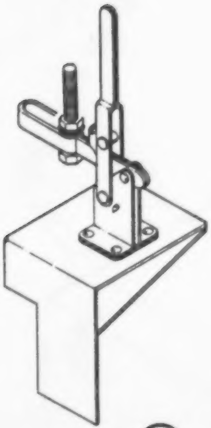
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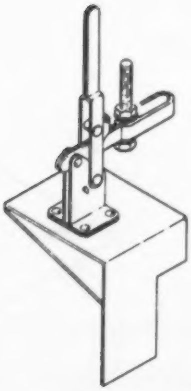
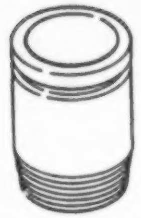

115

(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	(3) Usable On Code	(4) U/M	(5) Qty Rqr
113		PULLBOARD ASSEMBLY		EA	1
114		TOGGLE CLAMP AND BRACKET, LEFT HAND		EA	1
115		TOGGLE CLAMP AND BRACKET, RIGHT HAND		EA	1

Section II. COMPONENTS OF END ITEM (CONT)



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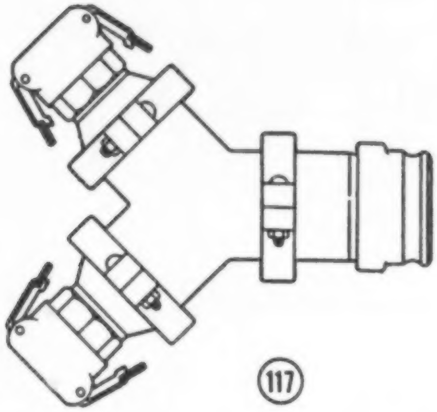

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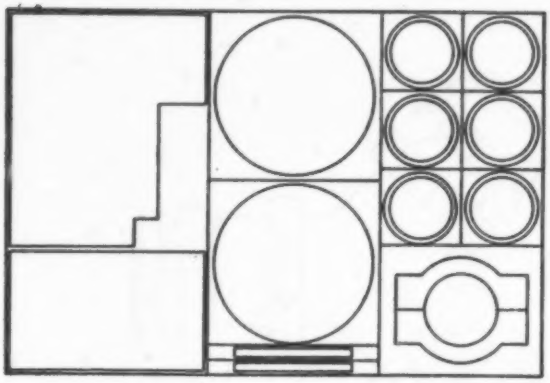
(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	Usable On Code	(4) U/M	(5) Qty Rqr
116		PIPE FITTING, COUPLING, 6 IN. (81349) M10388-A-07-AK-1-A-6A		EA	1
117		REDUCER, Y-CONNECTION, 6 X 4 X 4 IN. (97403) 13225E9190		EA	1

Section II. COMPONENTS OF END ITEM (CONT)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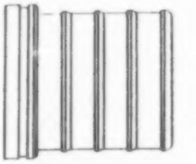
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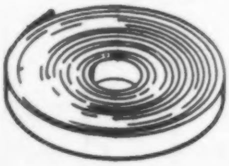
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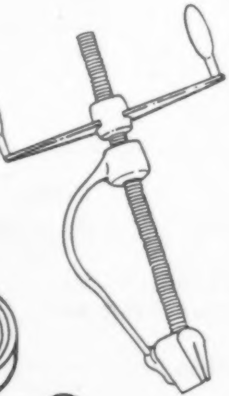
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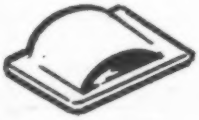
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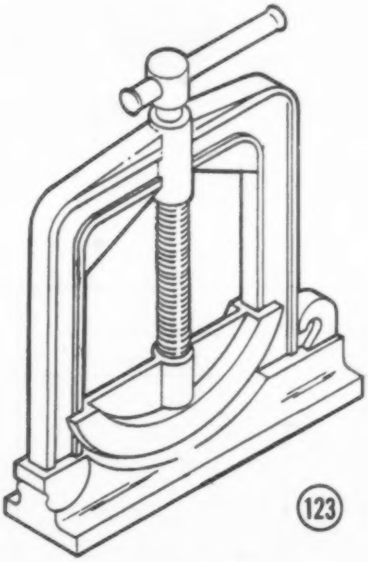
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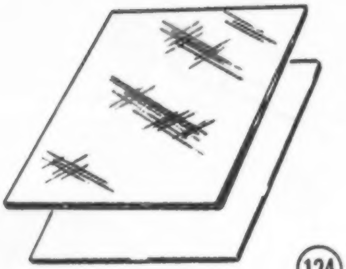
(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	Usable On Code	(4) U/M	(5) Qty Rqr
118		REPAIR KIT, HOSELINE, 6 IN. (97403) 13226E1581		EA	1
119		ADAPTER, GROOVED PIPE, 6 IN.		EA	6
120		BANDING STRAP, 3/4 IN. X 200 FT		EA	1
121		BANDING TOOL/SCREW ACTION		EA	1
122		BUCKLE, BANDING, 3/4 IN.		EA	100
123		CLAMP, HOSE, 6 IN.		EA	2

Section II. COMPONENTS OF END ITEM (CONT)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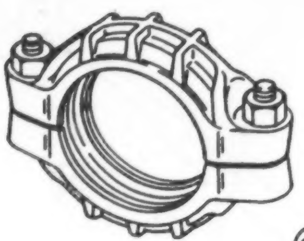
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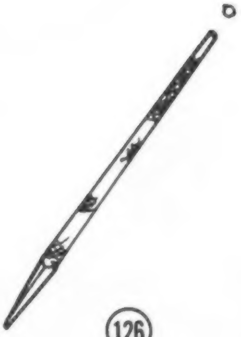
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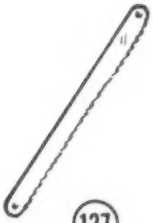
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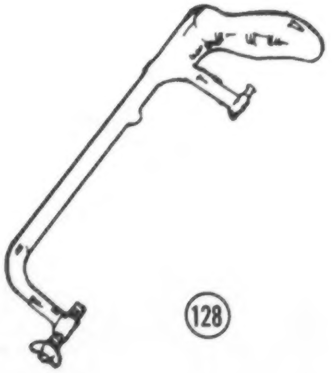
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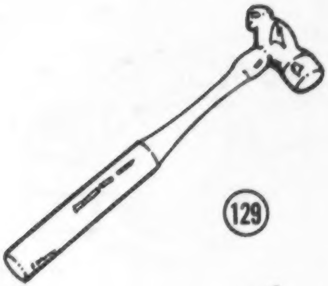
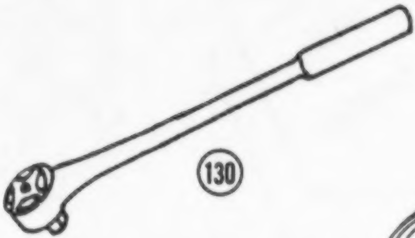
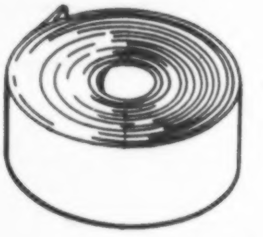
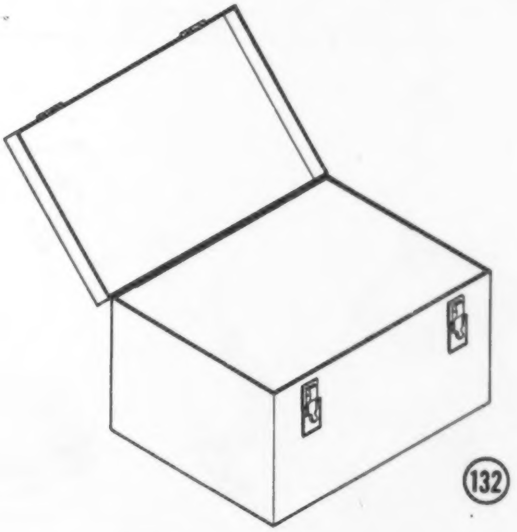
(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	(3) Usable On Code	(4) U/M	(5) Qty Rqr
124		CLOTH, EMERY, MEDIUM		EA	3
125		COUPLING, GROOVED PIPE, 6 IN.		EA	3
126		FILE, 1/2 ROUND, 8 IN.		EA	1
127		HACKSAW BLADE, 10 IN.		EA	10
128		HACKSAW FRAME, ADJUSTABLE		EA	1

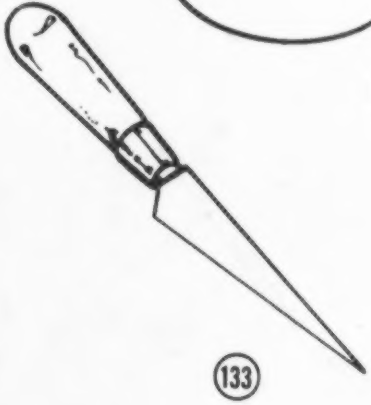
Section II. COMPONENTS OF END ITEM (CONT)





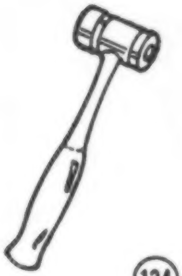






(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	Usable On Code	(4) U/M	(5) Qty Rqr
129		HAMMER, BALL-PEEN, 6 IN		EA	1
130		HANDLE, SOCKET WRENCH 3/4 IN. DRIVE		EA	1
131		HOSE, RUBBER, 6 IN. X 15 FT.		EA	2
132		KIT CHEST, METAL		EA	1
133		KNIFE, RUBBER CUTTING, 8 X 1 IN.		EA	1

Section II. COMPONENTS OF END ITEM (CONT)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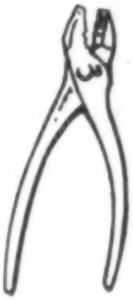
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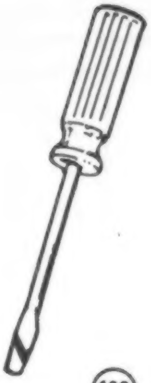
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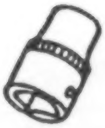
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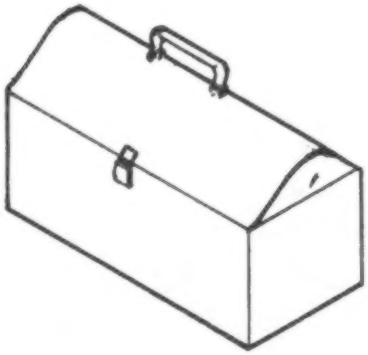
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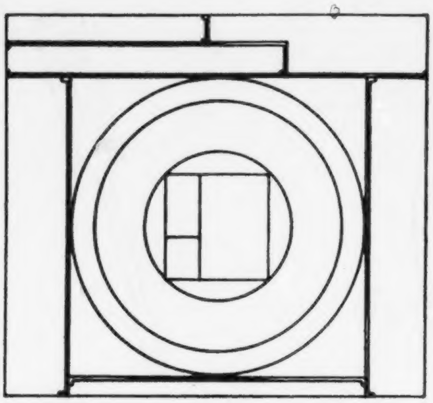
(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	Usable On Code	(4) U/M	(5) Qty Rqr
134		MALLET, RUBBER, 32 OZ		EA	1
135		PLIERS, LINESMANS		EA	1
136		SCREWDRIVER, 6-1/2 IN.		EA	1
137		SOCKET, 3/4 IN		EA	1
138		TOOL BOX, METAL		EA	1

Section II. COMPONENTS OF END ITEM (CONT)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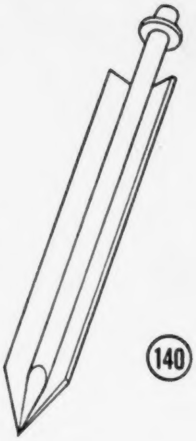
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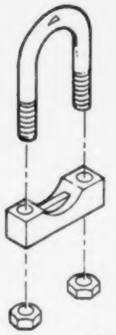
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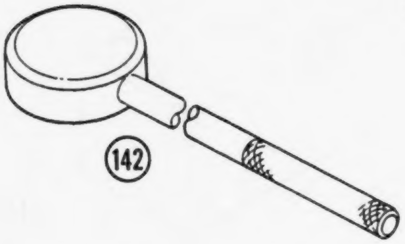
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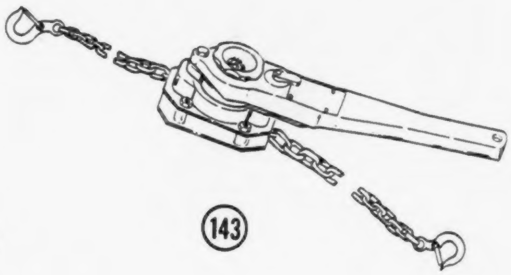
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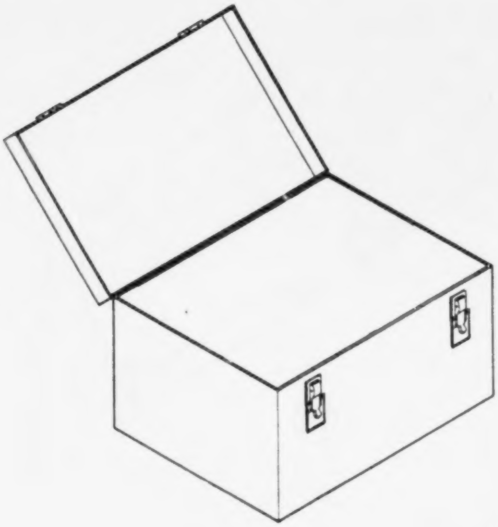
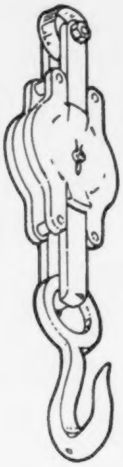
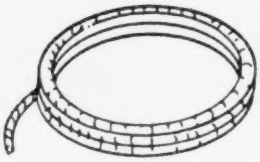
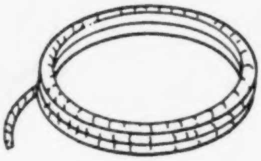
(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	(3) Usable On Code	(4) U/M	(5) Qty Rqr
139		SUSPENSION KIT, HOSELINE, 6 IN. (81349) MIL-S-53012		EA	5
140		ANCHOR STAKE, STEEL, 3/4 IN. X 34 IN.		EA	70
141		CLAMP, U-BOLT, 1/2 IN.		EA	125
142		DRIVING HEAD, STAKE		EA	5
143		HOIST		EA	5

Section II. COMPONENTS OF END ITEM (CONT)









(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	Usable On Code	(4) U/M	(5) Qty Rqr
144		KIT CHEST, METAL		EA	5
145		PULLEY BLOCK		EA	20
146		ROPE, MANILA, 1/2 IN. X 300 FT		EA	5
147		ROPE, WIRE, 1/2 IN. X 350 FT		EA	5

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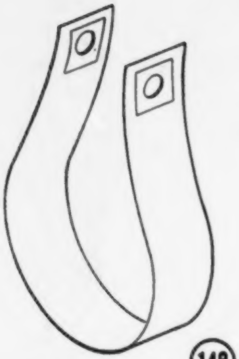
Section II. COMPONENTS OF END ITEM (CONT)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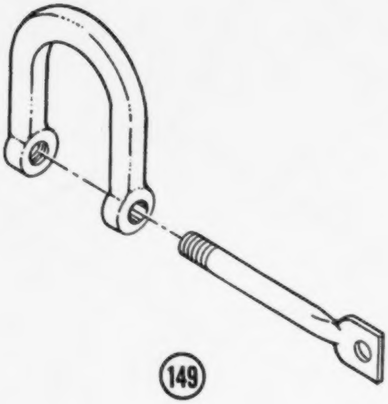
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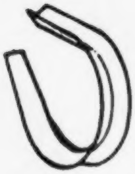
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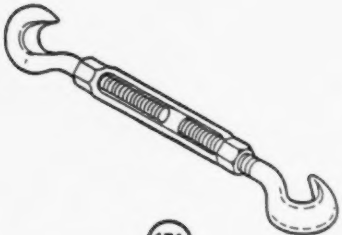
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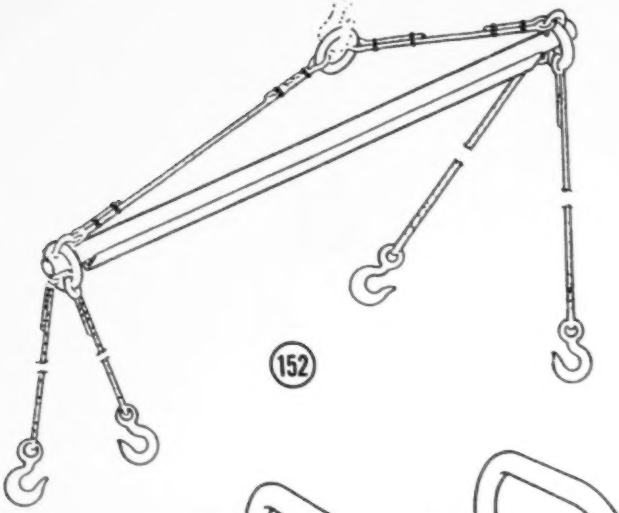
(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	(3) Usable On Code	(4) U/M	(5) Qty Rqr
148		SADDLE, 6 IN.		EA	300
149		SHACKLE, 1/2 IN.		EA	300
150		THIMBLE, WIRE ROPE, 1/2 IN.		EA	20
151		TURNBUCKLE, 3/4 IN. X 18 IN.		EA	20

Section II. COMPONENTS OF END ITEM (CONT)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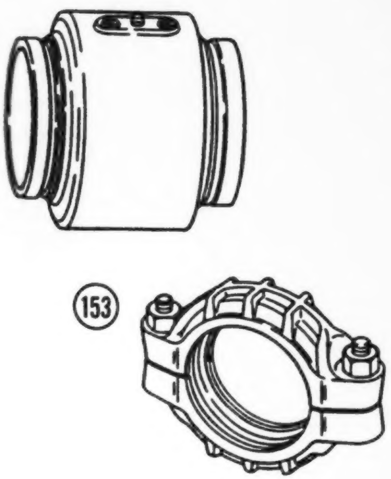
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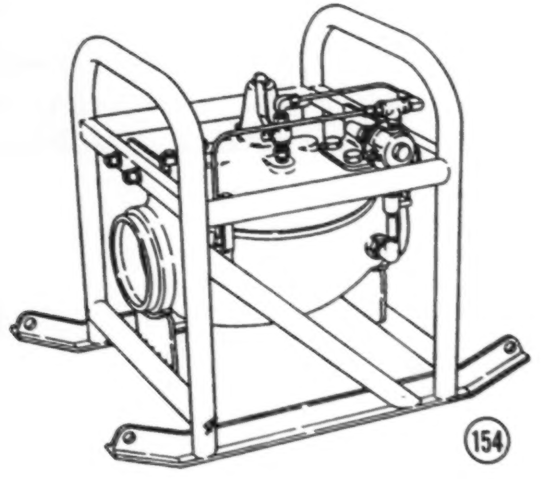
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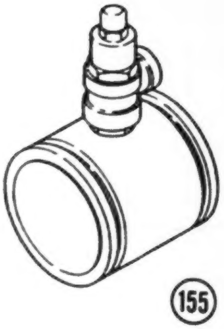
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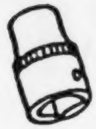
(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	(3) Usable On Code	(4) U/M	(5) Qty Rqr
152		SLING ASSEMBLY, FOUR LEG (LIFTING SLING) (97403) 13226E1582		EA	1
153		SWIVEL JOINT AND COUPLING, 6 IN. (81349) MIL-H-53027		EA	65
154		VALVE ASSEMBLY, PRESSURE REDUCING (86184) 6"-90G-01BV		EA	1
155		VALVE ASSEMBLY, PRESSURE RELIEF (97403) 13225E9196		EA	1

Section II. COMPONENTS OF END ITEM (CONT)



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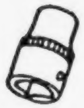

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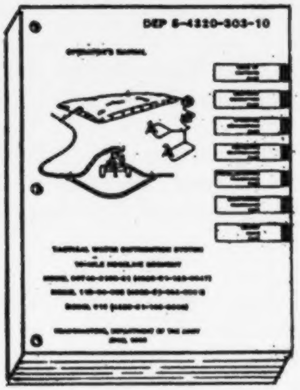
(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	Usable On Code	(4) U/M	(5) Qty Rqr
156		WRENCH, SOCKET, 1-1/4 IN. (97403) 1322E9090-27		EA	4
157		WRENCH, SOCKET, 1-1/16 IN. (97403) 1322E9090-26		EA	2

Section III. BASIC ISSUE ITEMS



(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	(4) U/M	(5) Qty Rqr
1		MANUAL, OPERATOR'S, TACTICAL WATER DISTRIBUTION EQUIPMENT SYSTEM (TWDS) SET 10-MILE SEGMENT, TM 5-4320-303-10	EA	8

APPENDIX C
ADDITIONAL AUTHORIZATION LIST

Section I. INTRODUCTION

C-1. **SCOPE.** This appendix lists additional items you are authorized for the support of the Tactical Water Distribution Equipment System.

C-2. **GENERAL.** This list identifies items that do not have to accompany the Tactical Water Distribution Equipment System and that do not have to be turned in with it. These items are all authorized to you by CTA, MTOE, TDA, or JTA.

C-3. **EXPLANATION OF LISTING.** National stock numbers, descriptions, and quantities are provided to help you identify and request the additional items you require to support this equipment. The items are listed in alphabetical sequence by item name under the type document (i.e., CTA, MTOE, TDA, or JTA) which authorizes the item to you. If item required differs for different models of this equipment, the model is shown under the "Usable on" heading in the description column. These codes are identified as:

Code	Used On
DTC	Model 06749-0183-81
DTQ	Model 110-00-0000
DTR	Model 919

Section II. ADDITIONAL AUTHORIZATION LIST

(1) National Stock Number	(2) Description FSCM and Part Number	Usable on Code	(3) U/M	(4) Qty Rqr
	BRUSH, SOFT		EA	6
	BRUSH, WIRE		EA	6
	PAIL, UTILITY, 1 GAL		EA	2
	SCRAPER, PLASTIC		EA	6
	WRENCH, COMBINATION BOX- AND OPEN-END, 1-3/8 IN.	DTR	EA	6
5120-00-277-1461	WRENCH, PIPE, 1 IN. MIN AND 2 IN. MAX		EA	2
5120-00-277-1481	WRENCH, PIPE, 2-7/8 IN. MIN AND 4 IN. MAX		EA	2

Section II. ADDITIONAL AUTHORIZATION LIST (CONT)

(1) National Stock Number	(2) Description FSCM and Part Number	Usable on Code	(3) U/M	(4) Qty Rqr
	WRENCH, PIPE, 6 IN.		EA	1
5120-00-895-9566	WRENCH SET, COMBINATION BOX- AND OPEN-END		EA	6

APPENDIX D
EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

Section I. INTRODUCTION

D-1. SCOPE. This appendix lists expendable/durable supplies and materials you will need to operate and maintain the Tactical Water Distribution Equipment system. This listing is for informational purposes only and is not authority to requisition the listed items. These items are authorized to you by CTA 50-970, Expendable/Durable Items (Except Medical, Class V, Repair Parts, and Heraldic Items), or CTA 8-100, Army Medical Department Expendable/Durable Items.

D-2. EXPLANATION OF COLUMNS

a. Column (1) - Item Number. This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the material (e.g., "Use cleaning compound, item 5, Appendix D.").

b. Column (2) - Level. This column identifies the lowest level of maintenance that requires the listed item.

C - Operator/crew
O - Organizational maintenance
F - Direct support maintenance
H - General support maintenance

c. Column (3) - National Stock Number. This is the National stock number assigned to the item; use it to request or requisition the item.

d. Column (4) - Description. Indicates the Federal item name and, if required, a description to identify the item.

e. Column (5) - Unit of Measure (U/M). Indicates the measure used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in., pr). If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy your requirements.

Section II. EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

(1) Item Number	(2) Level	(3) National Stock Number	(4) Description	(5) U/M
1	C	6850-00-181-7929	ANTIFREEZE, PERMANENT ETHYLENE GLYCOL (-65°F) INHIBITED (MIL-A-46153)	GL
2	C		BANDING, STEEL	FT
3	C		CALCIUM HYPOCHLORITE POWDER	DR
4	C	6810-00-266-6979	CALCIUM HYPOCHLORITE	OZ
5	C		PH INDICATOR SOLUTION, 70-250-S	OZ
6	C		LUBRICANT, SILICONE	OZ
7	C	9140-00-286-5295	OIL, FUEL, DIESEL, DF-2, REGULAR (VV-F-800)	GL
8	C		OIL, LUBRICATING, OE/HD 30, API (MIL-L-2104)	QT
9	C	7920-00-205-1711	RAGS, WIPING, (58536) A-A-531	EA
10	C		ROPE, NYLON	FT
11	C	6850-00-281-1985	SOLVENT, DRYCLEANING, TYPE 2 A-A-711	GL
12	C		TABLET, TEST, CHLORINE, DPD NO. 1	BX
13	C		TAPE, ADHESIVE	IN
14	C	8030-00-889-3535	TAPE, ANTISEIZE, TETRAFLUOROETHYLENE, MIL-T-27730	IN
15	C		TIES, CLOTH	EA
16	C	9150-00-935-1017	GREASE, AUTOMOTIVE AND ARTILLERY MIL-G-10924	LB

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JOHN A. WICKHAM, JR.
General, United States Army
Chief of Staff

Official:

R. L. DILWORTH
Brigadier General, United States Army
The Adjutant General

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6	2-1 a			In line 6 of paragraph 2-1a the manual states the engine has 6 Cylinders. The engine on my set only has 4 Cylinders. Change the manual to show 4 Cylinders.
81		4-3		Callout 16 on figure 4-3 is pointing at a bolt. In key to figure 4-3, item 16 is called a shim - Please correct one or the other.
125	line 20			I ordered a gasket, item 19 on figure B-16 by NSN 2910-00-762-3001. I got a gasket but it doesn't fit. Supply says I got what I ordered, so the NSN is wrong. Please give me a good NSN

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The Metric System and Equivalents

Linear Measure

1 centimeter = 10 millimeters = .39 inch
1 decimeter = 10 centimeters = 3.94 inches
1 meter = 10 decimeters = 39.37 inches
1 dekameter = 10 meters = 32.8 feet
1 hectometer = 10 dekameters = 328.08 feet
1 kilometer = 10 hectometers = 3,280.8 feet

Weights

1 centigram = 10 milligrams = .15 grain
1 decigram = 10 centigrams = 1.54 grains
1 gram = 10 decigram = .035 ounce
1 dekagram = 10 grams = .35 ounce
1 hectogram = 10 dekagrams = 3.52 ounces
1 kilogram = 10 hectograms = 2.2 pounds
1 quintal = 100 kilograms = 220.46 pounds
1 metric ton = 10 quintals = 1.1 short tons

Liquid Measure

1 centiliter = 10 milliters = .34 fl. ounce
1 deciliter = 10 centiliters = 3.38 fl. ounces
1 liter = 10 deciliters = 33.81 fl. ounces
1 dekaliter = 10 liters = 2.64 gallons
1 hectoliter = 10 dekaliters = 26.42 gallons
1 kiloliter = 10 hectoliters = 264.18 gallons

Square Measure

1 sq. centimeter = 100 sq. millimeters = .155 sq. inch
1 sq. decimeter = 100 sq. centimeters = 15.5 sq. inches
1 sq. meter (centare) = 100 sq. decimeters = 10.76 sq. feet
1 sq. dekameter (are) = 100 sq. meters = 1,076.4 sq. feet
1 sq. hectometer (hectare) = 100 sq. dekameters = 2.47 acres
1 sq. kilometer = 100 sq. hectometers = .386 sq. mile

Cubic Measure

1 cu. centimeter = 1000 cu. millimeters = .06 cu. inch
1 cu. decimeter = 1000 cu. centimeters = 61.02 cu. inches
1 cu. meter = 1000 cu. decimeters = 35.31 cu. feet

Approximate Conversion Factors

To change	*To*	*Multiply by*	*To change*	*To*	*Multiply by*
inches	centimeters	2.540	ounce-inches	newton-meters	.007062
feet	meters	.305	centimeters	inches	.394
yards	meters	.914	meters	feet	3.280
miles	kilometers	1.609	meters	yards	1.094
square inches	square centimeters	6.451	kilometers	miles	.621
square feet	square meters	.093	square centimeters	square inches	.155
square yards	square meters	.836	square meters	square feet	10.764
square miles	square kilometers	2.590	square meters	square yards	1.196
acres	square hectometers	.405	square kilometers	square miles	.386
cubic feet	cubic meters	.028	square hectometers	acres	2.471
cubic yards	cubic meters	.765	cubic meters	cubic feet	35.315
fluid ounces	milliliters	29,573	cubic meters	cubic yards	1.308
pints	liters	.473	milliliters	fluid ounces	.034
quarts	liters	.946	liters	pints	2.113
gallons	liters	3.785	liters	quarts	1.057
ounces	grams	28.349	liters	gallons	.264
pounds	kilograms	.454	grams	ounces	.035
short tons	metric tons	.907	kilograms	pounds	2.205
pound-feet	newton-meters	1.356	metric tons	short tons	1.102
pound-inches	newton-meters	.11296			

Temperature (Exact)

°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C